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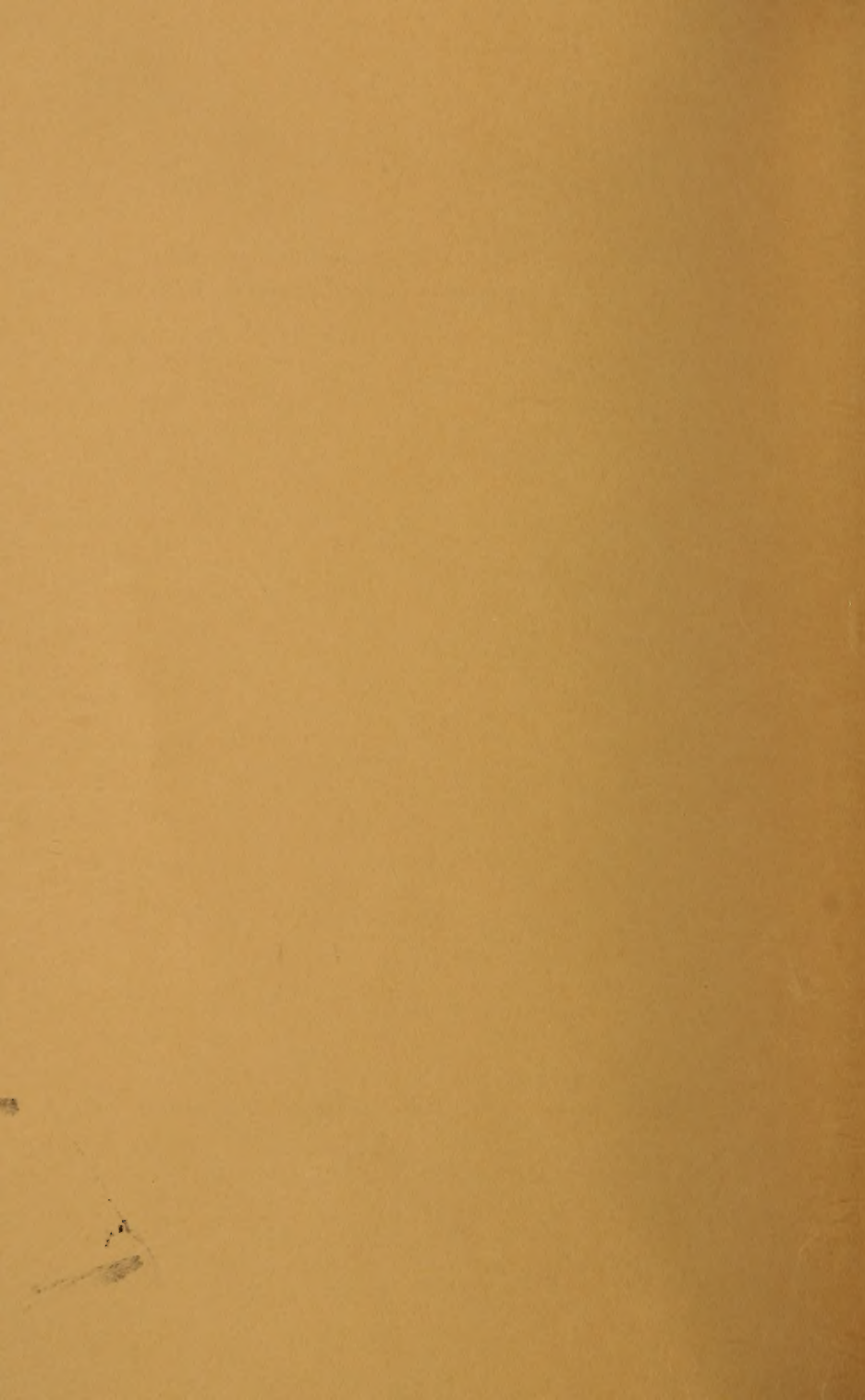
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STUDIES IN MACHAERIUM (LEGUMINOSAE) V.

History and Fossil Names

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A treatment of the genus Machaerium has long been scheduled for Flora Neotropica but as more collections become available more problems appear. For that reason it seems prudent to continue with interim reports and present some of the uncertainties that can best be resolved by persons in the areas where they can study the plants in the field as well as in the herbarium.

History

The genus Machaerium was established by Persoon in 1807 to include three species that he separated from Nissolia: M. ferrugineum (Willd.) Pers., M. punctatum (Poir.) Pers., and M. reticulatum (Poir.) Pers. He retained in Nissolia two species; N. fruticosa Jacq., now conserved as the type of Nissolia, and N. arborea Jacq., later transferred to Machaerium by Vogel.

Medicus, some 20 years earlier, in 1787, had published two genera; Quinata, based on Nissolia quinata Aubl., which is also the basionym of N. ferruginea Willd.; and Nissolius, based on Nissolia arborea Jacq. These two genera, Quinata Medic. and Nissolius Medic., were proposed and recommended for rejection vs. conservation of Machaerium Pers. (Taxon 18: 593. 1969; 20: 388; 1971). By action of the 12th International Botanical Congress at Leningrad in 1975, Machaerium Pers. was approved for conservation.

In 1820, one species was added to the genus, Machaerium aculeatum Kaddi, and in 1824, another, M. acuminatum H.B.K. A new variety, M. ferrugineum var. glabrescens E. Meyer, was also published in 1824 but subsequently ignored. The type has not been located and there is some question as to the taxon's being referable to Machaerium.

De Candolle, in 1825, reduced Machaerium to a section of Nissolia with the comment, "An genus proprium?". He included in the section only two species previously referred to Machaerium, M. ferrugineum and M. acuminatum, but added two of Poirlet's species of Nissolia, N. polyphylla and N. microptera and three new species, N. diadelphica DC., N. leiophylla DC., and N. robiniaefolia ("robiniaefolia") DC. Persoon's remaining species of Machaerium, M. punctatum (as N. stipitata DC.), and M. reticulatum, both originally cited as from Madagascar, were relegated, under Nissolia, to "Species non satis notae". In his "Mémoires sur la famille des légumineuses" (1826, p. 270), de Candolle stated that for the present he preferred to reunite all the species of Nissolia into one genus but, perhaps, one day when the species were better known, the opinion of Persoon, dividing Nissolia into two genera, would be adopted.

Vellozo, in his *Flora Fluminenses* (Text 1825; Icones 1831), published 14 species of Nissolia, 11 of which are now referred to Machaerium.

Vogel, in March 1837, in a paper "*Dalbergiearum Genera Brasiliensia*", again recognized Machaerium as a separate genus and published 22 new species and an additional two varieties. In a following paper, in April-June, another species was published. The taxa were divided into two groups without formal designation as I. Inermes and II. Armatae.

More or less simultaneously, Bentham was working on South American legumes and, in June 1837, published his "*Commentationes de Leguminosarum Generibus*". Later, in 1839, it appeared as "*De Leguminosarum Generibus Commentationes*" in *Ann. Wiener Mus.* 2: 51-142. A total of 51 species of Machaerium were included, followed by a half dozen names of Nissolia cited as "*Species valde dubiae sunt.*" On the basis of leaf venation and stipule characters the species were grouped into three unnamed categories.

In the course of the next two decades another dozen or so species of Machaerium were published by various authors. The most comprehensive treatment of the genus in the nineteenth century was by Bentham in his "*A Synopsis of the Dalbergieae*" (*Jour. Linn. Soc.* 4, suppl.: 52-71. 1860). In this paper, a byproduct of the work for Martius's "*Flora Brasiliensis*" which appeared two years later, all species known to date were assessed. After some reduction to synonymy and transfer to other genera, a total of 56 species remained. Four doubtful species of Nissolia; N. dubia Poir., N. microptera Poir., N. retusa Willd., and N. reticulata Lam., were noted as "probably synonyms to some of the *Machaeria* above enumerated." Bentham divided Machaerium into five series: 1. Lineata; 2. Oblonga; 3. Acutifolia; 4. Reticulata, and 5. Penninervia, based chiefly on characters of the leaflets and whether the stipules were spinescent or not as in his earlier treatment. These five series were later given sectional status by Taubert (in *Engl. & Prantl, Naturl. Pflanzenfam.* 3: 337. 1894).

No new species of Machaerium were published until after 1900 when there was a resurgence of taxonomic interest in the genus. Noteworthy was Ducke's acceptance of the natural integrity of Machaerium and Drepanocarpus G. F. W. Meyer, and his transference of seven Brazilian species of Drepanocarpus to Machaerium.

In 1941 Hoehne published the first revision of the augmented genus with a total of 121 species of Machaerium (*Flora Brasílica* 25 (3). 1941). Included were 107 illustrations. Unfortunately, some types and other critical specimens were not available to him, and a number of problems continued to remain unsolved.

A division of the genus into "species series" on the basis of phytochemical characteristics was proposed by Oliveira, et al. in 1971 (Phytochem. 10: 1863-1876). Apparently, only eight species were considered, which were placed into two groups, the *Machaeria scleroxyla*, with three species: *M. scleroxylum* Tul., *M. nyctitans* (Vell.) Benth., as "*nyctitans*", and *M. kuhlmannii* Hoehne, and the *Machaeria villosa*, with five species: *M. villosum* Vog., *M. acutifolium* Vog., *M. mucronulatum* Mart., *M. opacum* Vog., and *M. vestitum* Vog. It is interesting to note that there is a correlation with the earlier treatments; the species of Oliveira's series *M. scleroxyla* fall into Bentham's series *Oblonga*, and those of the *M. villosa* series into Bentham's series *Reticulata*.

The history of *Drepanocarpus*, intended to comprise species with lunate fruit rather than alate, has run essentially parallel to that of *Machaerium*. The genus was described as new in 1818 by G. F. W. Meyer in his "*Primitiae florae essequiboensis*" and was based on *Pterocarpus lunatus* L.f. Three species were added in 1824; *D. dubius* H.B.K., *D. isadelphus* E. Meyer, and *D. microphyllus* E. Meyer, and one more in 1825; *D. cyathiformis* DC. The latter, based on one of the unpublished icones of Sessé and Mociffo, is, apparently, referable to *Dalbergia monetaria* L.f.

About 15 names, some synonyms, were added before 1860 when, in that year, Bentham (op. cit.) recognized eight species divided equally between two series, *Lineati* and *Reticulati*, which were comparable to his series *Lineata* and *Reticulata* of *Machaerium*. In addition, listed as doubtful, were *D. dubius* H.B.K., *D. cyathiformis* DC., *D. falcatus* Miq., and an undescribed species from Mexico, later published by Hemsley as *D. mucronulatus*, actually a synonym of *Aeschynomene amorphoides* (S. Wats.) Rose ex Robins. Bentham's treatment of *Drepanocarpus* in Martius's *Flora Brasiliensis*, with seven species and five illustrative plates, is interesting in that the species of *Drepanocarpus* and *Machaerium* are commingled into one key.

Another 13 names were assigned to *Drepanocarpus* before 1922 when Ducke (Arch. Jard. Bot. Rio de Janeiro 3: 151, 152, 1922) referred to it as a subgenus of *Machaerium*: "Il n'est pas possible de conserver le genre *Drepanocarpus*, on seulement parcequ'il ne représente qu'une forme du genre *Machaerium* adaptée à la dissémination par l'eau . . . , mais surtout à cause des formes intermédiaires entre les deux types de fruit qui, seule, ont servi à établir les deux genres." Concerning *M. leiophyllum* (DC.) Benth. he stated: "Cette espèce dont le fruit représente un premier degré de transition vers le type de celui du sousgenre *Drepanocarpus*." Two species were cited with indications of their referral to the subgenus, "*Machaerium* (*Drepanocarpus*) *frondosum* (Mart.) Ducke, n. comb!" and "*Machaerium* (*Drepanocarpus*) *macrocarpum* Ducke n. sp."

In 1925 (Arch. Jard. Bot. Rio de Janeiro 4: 1-342), in a paper on the legumes of the State of Pará, Brazil, Ducke treated Drepanocarpus as a synonym of Machaerium without designation as a sub-genus, with no explanation except to reiterate that the species with alate fruit were destined for dissemination by wind and those of the old genus Drepanocarpus by water.

Since Ducke's time, with few exceptions, authors have accepted the realistic reduction of Drepanocarpus to synonymy under Machaerium.

Three other generic names are synonymous with Drepanocarpus and, therefore, Machaerium: Sommerfeldtia Schum. & Thonn., published in 1828, with one species, S. obovata, a synonym of M. lunatum (L.f.) Ducke; Nephrosis Rich. ex DC. and Orucaria Juss. ex DC. The latter two were herbarium names cited as synonyms under Drepanocarpus, each with one species also synonymous with M. lunatum.

Fossil Names

At least 11 species of fossil Machaerium and five of Drepanocarpus have been described from Tertiary and Quaternary formations. Of these, four species of Machaerium and one of Drepanocarpus are from South America within the present range of the combined genus, Machaerium. Seven species of Machaerium and four of Drepanocarpus have been described from Europe, a somewhat questionable area of origin. In addition, the modern species, M. quinata (Aubl.) Sandw., as M. ferrugineum, has been cited from the Miocene of Bavaria !

On the basis of the illustrations I have seen, I hesitate to endorse any of the determinations. In the genus Machaerium, including Drepanocarpus, there is such variability in leaflet size, shape, and venation pattern that it is difficult even to recognize sterile modern material unless one is already well acquainted with the species.

The following citations, mostly obtained from the card file in the Paleobotany Laboratory of the Smithsonian Institution, are listed here chiefly to avoid possible repetition of the names for new species, either fossil or modern. Unfortunately, the list may be incomplete because maintenance of this file has been discontinued.

Fossil *Machaerium* from South America:

M. acreanum Maury, Min. Agr. Serv. Geol. & Min., Rio de Janeiro, Bol. 77: 20, fig. 8. 1937. Brazil, Acre, upper Rio Juruá. Pliocene.

M. eriocarpoides Engelhardt, Sitz. Naturw. Gesell. Isis, Dresden, Abh. 1: 8, pl. 1, fig. 28. 1894. Bolivia, Cerro do Potosí. Quaternary.

M. milleri Berry, Proc. U. S. Nat. Mus. 54: 147, pl. 17, fig. 7. 1917. Bolivia, Potosí. Pliocene.

M. premuticum Berry, Johns Hopkins Univ. Studies Geol. n° 12: 85, pl. 16, fig. 1. 1937. Brazil, Acre, upper Rio Juruá. Pliocene.

Fossil *Drepanocarpus* from South America:

D. franckei Engelhardt, Sitz. Naturw. Gesell. Isis, Dresden, Abh. 1: 7, pl. 1, figs. 36-38. 1894. Bolivia, Cerro do Potosí. Quaternary.

Fossil *Machaerium* from Europe:

M. budense Stur in Staub. Jahrb. k. Ung. Geol. Anst. 214. 1885 (1887), nom. nud. Hungary, Budapest. Oligocene.

M. eulefeldi Engelhardt, Abh. Grossh. Hess. Geol. Landesanst. Darmstadt 5: 311, pl. 17, fig. 6. 1914. Thuringia, Altenschlirf in Bogelsberg. Tertiary.

M. ferrugineum Persoon, E. Hofmann, Verhandl. Geol. Bundesanst., n° 4: 95. 1932. So. Bavaria, Salzach. Miocene.

M. kahlenbergi Friedrich, Abh. Geol. Specialk. Preuss 4 (3): 399 (241), pl. 31, figs. 7-9. 1883. Saxony, Trotha. Oligocene.

M. muticoides Engelhardt, Abh. Hess. Geol. Landesanst. Darmstadt 7(4): 113, pl. 38, fig. 4. 1922. Hesse, Messel bei Darmstadt. Lower Tertiary.

M. palaeogaeum Ettingshausen, Denkschr. K. Akad. Wiss. 29 (Foss. Fl. Bilin. pt. 3): 59, pl. 55, fig. 24. 1869. Bohemia, Kutschlin. Miocene.

M. tenuinervium Pim, cited in Flora U.S.S.R. 13: 294. 1972, English translation. "In Sarmatian deposits of the Black Sea area (Amvrosievka)".

M. trioptolemaeoides Massalongo, Syn. Fl. Foss. Senog. 130. 1858 (for *Cassia berenices*, ex parte).

Fossil *Drepanocarpus* from Europe:

D. bolcensis Unger, Sitzungsab. K. Acad. 18: 31, pl. 1, fig. 2. 1855. Carinthia, Prevali. Eocene.

D. decampii (Massalongo) Massalongo, Atti R. Ist. Veneto Sci. 3 (3): 770. 1858. ("*Robinia*"). Italy, Monte Bolca. Eocene.

D. nummus (Massalongo) Massalongo, Atti R. Ist. Veneto Sci. 3 (3): 771. 1858. ("*Pterocarpus*"). Italy, Monte Bolca. Eocene.

D. punctulatus Saporta, Schimper, Pal. Veg. 3: 363, pl. 54, fig. 34. 1874. Italy, Chiavon. Oligocene.

STUDIES IN MACHAERIUM (LEGUMINOSAE) VI.

Velva E. Rudd

Machaerium is a genus of neotropical, papilionoid legumes known from México southward to Perú and Argentina, with one species extending into the Antilles and to the west coast of Africa.

It appears to be most closely related to Dalbergia with which it is frequently confused. Machaerium differs in having stamens with anthers dorsifixed rather than basifixed as in Dalbergia, and fruit usually with a basal seed and a terminal wing. In the species with lunate or reniform fruit, lacking an extended wing, the seed is near the base. The fruits of Dalbergia lack a terminal wing, are sometimes orbiculate, sometimes oblong, many-seeded, and, if lunate, the seeds are more or less centrally placed. For more contrasting characters see T. Baretta-Kuipers, 1971 (Acta Bot. Neerl. 20(6): 655-662).

Systematic Treatment

MACHAERIUM Persoon, Syn. Pl. 2: 276. 1807, nom. cons.

Lectotype species: M. ferrugineum (Willdenow) Persoon, based on Nissolia ferruginea Willdenow, Sp. Pl. 3(2): 900. 1802, based on Nissolia quinata Aublet, Fl. Guian. 2: 743, t. 297. 1775 = Machaerium quinata (Aublet) Sandwith, Kew Bull. 1931: 359. 1931. (Lectotype designated by Burkart, Leg. Arg. 543. 1943). For additional synonymy see Taxon 18(5): 593. 1969.

Trees, shrubs, or lianas, armed with spinescent stipules or unarmed; stipels lacking. Leaves alternate, imparipinnate, with few to many leaflets. Leaflets alternate, small to moderately large. Inflorescences racemose or paniculate, terminal or axillary; bracts usually small, caducous, sometimes spinescent and persistent; bracteoles usually small, paired at the base of the calyx. Flowers papilionoid, small to medium in size; calyx campanulate with 5 subequal lobes, petals 5, white to yellow, pink, blue, or purple, glabrous or pubescent; stamens 10 with the filaments connate at the base, sometimes separating into two fascicles of 5 stamens each or with the vexillar stamen separate, at least at the base; anthers small, elliptic, dorsifixed; ovary brevistipitate with 1 or 2 ovules; style filiform, somewhat incurved; stigma minute, capitate, terminal. Fruit laterally compressed, usually 1-seeded, samaroid with a basal seed and a terminal wing, or lunate to reniform with the wing reduced or lacking; seed compressed, ovate, orbicular, or reniform. 2n = 20.

It is sometimes confusing that a species is variously cited as tree, shrub, or liana. Small specimens of about 1-2 m tend to be reported by collectors as shrubs. Taller plants, standing alone, may remain erect and tree-like. Others, with weaker stems, become leaners and eventually climbers. Many species produce "searcher-shoots" or "explorer-shoots" armed with recurved spines that hook on to adjacent plants and continue as high climbing lianas.

SECTION I. *MACHAERIUM*

The five series, or sections, into which the genus *Machaerium* has been divided are partly natural and partly artificial. There is some intergradation between the groups. Possibly this accounts for Bentham's preferring to designate them as series rather than as sections.

I have found it convenient to recognize four sections: *Machaerium* (*Penninervia*); *Lineata*; *Oblonga*; and *Reticulata*, including *Acutifolia*.

Key to sections

Leaflets with venation craspedodromous, the secondary veins approximately parallel, usually well defined, extending to the margin, or nearly so.

Secondary veins about 3-25 mm apart. . . . Section I. *Machaerium*

Secondary veins crebrous, about 1 mm apart. Section II. *Lineata*

Leaflets with venation camptodromous, the secondary veins not extending to the margin, sometimes weakly defined.

Shape of leaflets predominantly oblong or elliptic and relatively small. Section III. *Oblonga*

Shape of leaflets predominantly ovate, sometimes lanceolate or oblong, usually larger than in Section *Oblonga*
Section IV. *Reticulata*

MACHAERIUM PERS. SECTION I. *MACHAERIUM*

Machaerium Pers. series *Penninervia* Benth. Jour. Linn. Soc.4, suppl.: 54, 67. 1860. Lectotype species: *M. ferrugineum* (Willd.) Pers., a synonym of *M. quinata* (Aubl.) Sandw.

Machaerium Pers. section *Penninervia* (Benth.) Taubert, in Engler and Prantl., Natürl. Pflanzenfam. 3(3): 337. 1894.

Trees, shrubs, or lianas, commonly armed with spinescent stipules; leaflets relatively large, about 3-26 cm long with craspedodromous venation, the secondary veins usually well defined, about 3-25 mm apart, extending to the margin or nearly so; fruit alate with a terminal wing to wingless, lunate-reniform to falcate; stamens monadelphous or with a tendency toward diadelphous with the vexillar filament separate, sometimes varying within the same species.

Only five of the eight species included in Bentham's original series *Penninervia* are being retained in this present treatment. The species retained are: *M. ferrugineum*, a synonym of *M. quinata*; *M. floribundum*; *M. lindenianum*; *M. macrophyllum*; and *M. nigrum*. The three excluded species, *M. eriostemon*, a synonym of *M. violaceum*, *M. kegelii*, and *M. lanatum*, a synonym of *M. villosum*, are now transferred to section *Reticulata*. The latter species is more or less intermediate, with leaflets of a few specimens showing a tendency toward both types of venation; most specimens, however, appear to be most closely related to species in section *Reticulata*.

KEY TO SPECIES OF SECTION MACHAERITUM

1. Lower surface of leaflets with hairs lax or crispate, not short, appressed; stamens monadelphous; fruit pubescent, sometimes glabrescent with age.
2. Fruit alate with the wing about 2-4 times the length of the seminiferous body.
3. Flowers 7-17 mm long; calyx 2.5-6 mm long; fruit straight or slightly curved.
4. Pubescence generally fulvous or ferrugineous; flowers 7-17 mm long on pedicels about 1-5 mm long; calyx tomentulose or velutinous, not noticeably striate.
5. Vexillum pubescent; flowers 8-17 mm long on pedicels 1-3 mm long; calyx 2.5-6 mm long, 2-4 mm in diameter; bracteoles broadly ovate to suborbicular.
6. Flowers about 12-17 mm long; calyx 4-6 mm long, 3-4 mm in diameter; bracteoles 2-3 mm long, 3-4 mm wide. Martinique, introduced; Venezuela; Guyana; Surinam; French Guiana; Brazil
- la. M. quinata var. quinata
6. Flowers about 8-12 mm long; calyx 2.5-3 mm long, 2-3 mm in diameter; bracteoles 1-2 mm long, 1.5-2.5 mm wide. Colombia; Venezuela; French Guiana; Brazil
- lb. M. quinata var. parviflorum
5. Vexillum glabrous or nearly so; flowers 7-10 mm long on pedicels about 5 mm long; calyx 3-3.5 mm long, 2.5 mm in diameter; bracteoles lanceolate to oblong. Colombia; Venezuela. . .
3. M. lindenianum
4. Pubescence generally sordid; flowers 7-10 mm long, sessile; calyx sericeous, strongly striate. Brazil . . .
4. M. nigrum
3. Flowers 5-6 mm long, essentially sessile; calyx 2-2.5 mm long; fruit more or less sigmoid. Brazil . .
5. M. piresii
2. Fruit lunate-reniform, wingless. Colombia; Peru; Brazil. . .
2. M. duckeanum
1. Lower surface of leaflets glabrous or with hairs appressed and usually minute; stamens monadelphous or diadelphous, 5:5 or 9:1; fruit pubescent or glabrous.
7. Leaflets obovate to elliptic.
8. Fruit alate; flowers 5-7 mm long; calyx 2.5-3 mm long, 1.5-2 mm in diameter. Colombia; Perú; Venezuela; Guyana; Surinam; Brazil. . .
- 6a. M. macrophyllum var. macrophyllum
8. Fruit reniform or with a short, wide wing; flowers 8-12 mm long; calyx 3-5 mm long, 2.5-3 mm in diameter. Brazil. . .
- 6b. M. macrophyllum var. brevialatum
7. Leaflets predominantly ovate to elliptic.
10. Fruit alate or subreniform, fulvo- or ferrugineo-puberulent, sometimes glabrescent with age, usually light brown when dry, stipe about 3-5 mm long; calyx sericeous; bracteoles densely pubescent, about half as long as the calyx or less; leaflets usually not blackening on drying.

11. Flowers about 6-10 mm long; calyx 3-4 mm long, 2-2.5 mm in diameter; leaflets sericeous to sparsely pubescent with short, appressed hairs to subglabrous on the lower surface; fruit alate. México southward to Colombia; Venezuela; Guyana; French Guiana; Brazil; Perú. 7a. *M. floribundum* var. *floribundum*
11. Flowers about 4-6 (-7) mm long; calyx 2-2.5 mm long, 1-2 mm in diameter; leaflets sericeous to moderately pubescent on the lower surface.
12. Leaflets fulvo- or ferrugineo-sericeous beneath, sometimes glabrescent; fruit falcate-subreniform. Perú; Bolivia. 7b. *M. floribundum* var. *parviflorum*
12. Leaflets silvery-sericeous beneath; fruit not known. Perú. 7c. *M. floribundum* var. *hypercyreum*
10. Fruit alate, glabrous, usually black when dry, stipe about 10-15 mm long; calyx ciliolate, otherwise glabrous; bracteoles glabrous, ciliolate, usually slightly longer than the calyx; leaflets usually blackening on drying. Colombia; Venezuela; Surinam; French Guiana; Brazil. . . 8. *M. paraense*

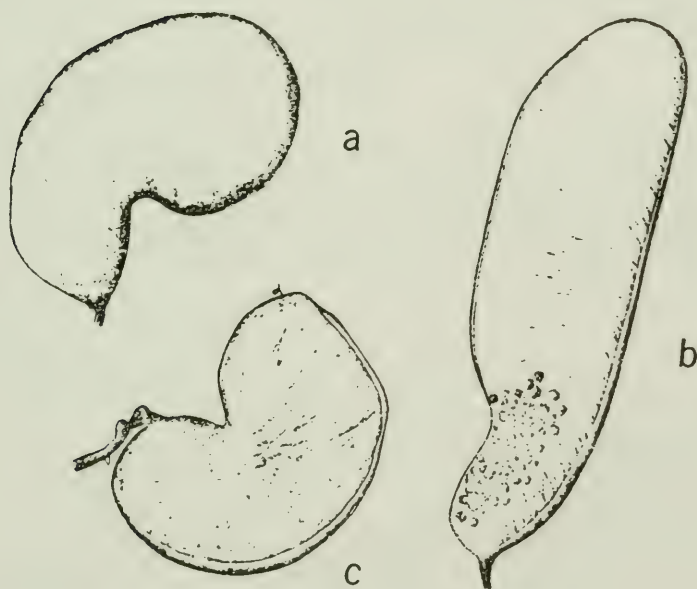


Figure 1. Fruit of: a. *Machaerium macrophyllum* var. *brevialatum*; b. *M. quinata* var. *quinata*; c. *M. duckeanum* (from Ducke in Arch. Jard. Bot. Rio 5: 134, pl. 11, figs. 15, 17, 18. 1930).

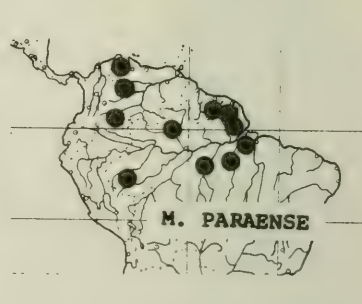
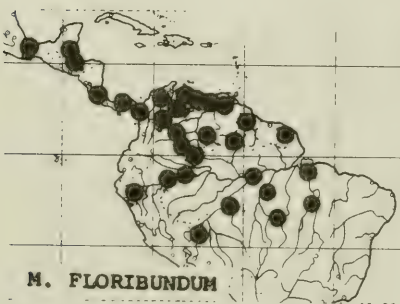
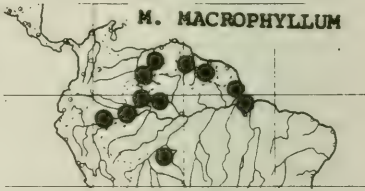
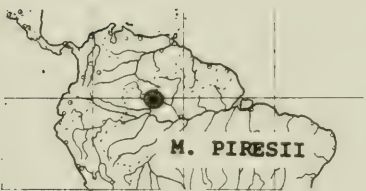
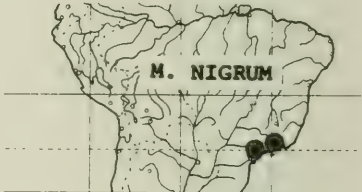
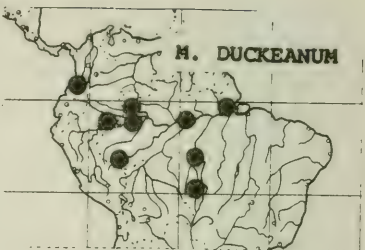
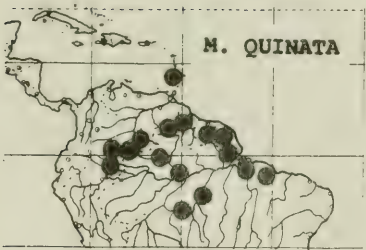


Figure 2. Geographic distribution of species in Machaerium section Machaerium.

1. MACHAERIUM QUINATA (Aublet) Sandwith, Kew Bull. 1931: 359. 1931.

Trees, shrubs, or lianas, to about 16 m tall, usually unarmed; young stems ferrugineo-tomentulose, glabrescent; stipules deltoideolanceolate, acuminate, striate, moderately pubescent, about 10-15 mm long, 4-10 mm wide at the base, caducous or sometimes indurated. Leaves 5-15-foliolate, axis ferrugineo-tomentulose, about 6-18 cm long, leaflets coriaceous, about 4-15 cm long, 1.5-7.5 cm wide, oblong, ovate, or obovate, acute, breviacuminate, or obtuse, apiculate at the apex, obtuse to cuneate at the base, puberulent to glabrous above, crisp-pubescent beneath, secondary veins conspicuous, about 12-20 on a side, essentially parallel, extending to the margin, tertiary veins percurrent, scalariform. Inflorescences racemose or paniculate, axillary or terminal with axes ferrugineo-tomentulose; bracts striate, tomentulose, glabrescent, linear to ovate, acuminate, 10-30 mm long, 2-7 mm wide, caducous; bracteoles tomentulose, broadly ovate, obtuse, 1-4 mm long, 1.5-4 mm wide, caducous. Flowers 8-17 mm long on pedicels 1-3 mm long; calyx ferrugineo-tomentulose or velutinous, 2.5-6 mm long, 2-4 mm in diameter; petals purple to pink or white, vexillum pubescent on the outer face; stamens 10, monadelphous. Fruit winged, straight or slightly bent, ferrugineo-tomentulose, 7-11 cm long including stipe about 1 cm long, seminiferous body 1.5-3.5 cm long, 1-1.5 cm wide, wing about 4-7 cm long, 1.5-3 cm wide.

1a. MACHAERIUM QUINATA var. QUINATA

Machaerium quinata (Aublet) Sandwith, Kew Bull. 1931: 359. 1931.

Nissolia quinata Aublet, Fl. Guian. 2: 743; 4: tab. 297. 1775.

Type: J. E. C. F. Aublet s. n., French Guiana (holotype W;

isotypes Ek, F fragm. ex W, F neg. 32075 ex W, P-Juss, W).

Quinata violacea Medikus, Vorles. Charpff. Phys.-Oken. Gen. 2: 389.

1787, based on Nissolia quinata Aublet, non Machaerium violaceum Vogel 1837.

Nissolia ferrugineum Willdenow, Sp. Pl. 3: 900. 1802, based on

Nissolia quinata Aublet.

Machaerium ferrugineum (Willdenow) Persoon, Syn. Pl. 2: 276. 1807.

Nissolia diadelphus de Canolle, Prod. 2: 258. 1825.

Type: G. S. Perrottet 29, French Guiana, Cayenne (holotype G-DC; F neg. 6942 ex G; isotype FI).

Machaerium diadelphum (DC) Vogel, Linnaea 11: 182. 1837.

Machaerium lignosum Benthams, in Martius, Fl. Bras. 15(1): 253,

1862, nomen in synonym.

The typical variety is represented by specimens with relatively large flowers, 12-17 mm long, commonly about 13-15 mm long; calyx tomentulose, 5-6 mm long, 3-4 mm in diameter; bracteoles 2-3 mm long, 3-4 mm wide.

Distribution: On "terra firme", igapo, riparian forest, and savanna, usually in sandy soil, at elevations up to about 300 m, southern Venezuela, Guyana, Surinam, French Guiana, and northern Brazil. Introduced in Martinique.



Nissolia Quinata

Figure 3. *Nissolia quinata* Aubl., basionym of *Machaerium quinata* (Aubl.) Sandw. Copy of plate 297, Aubl., Fl. Guian. 4. 1775.

Local names: Acayere (Venezuela); kraboejassi tetei (Surinam); kunikully (Guyana); quinata (French Guiana); timbo brabo (Brazil); waliballi or wariballi (Surinam).

Martinique: St. Pierre, Jardin Botanique, Duss 350 (NY).
Mornes au Nord du St. Pierre, Belanger 686 (FI, G, F). "Antilles",
de Tussac s. n. (FI, G).

Venezuela: Amazonas: "Prope San Carlos, ad Rio Negro, Brasilia"
Spruce 3688 (BM, Bk, F, FI, G, GH, GOET, K, NY, P, W). Rio Negro,
Kiedel 41 (K), s. n. (K). Bolívar: On island 1 mi above Raudal Agua-
canta, Río Paragua, Cerro Guaquinima, Maguire 32706 (NY, US, VEN).
Santa Elena, margin of Rio Kukenán, Tamayo 2713 (UC, US, VEN).
Selva del Río Cuyani, Cardona 2801 (VEN). About 40 km S of El Dor-
ado, along road in primary forest, Meijeraan 36 (WAG).

Guyana: without exact locality, A. Anderson s. n. (BK); Appun 349 (K), 628 (K); Kich. Schomburgk 1079 (BM, P), s. n. (W); Robt. Schomburgk 579 (BM, F, FI, G, K, L, P, W), 816 (BM, G, GH, K, NY, P, W). Talbot s. n. (K). Essequibo, G. F. W. Meyer 253 (GOET); Jenman 1158 (K). Mazaruni Sta., For. Dept. B. G. 4157, Fanshawe 1421 (K, NY). Kurupung, Jacoba, Lang & Persaud 251 (F, US), 265 (F, NY). Mazaruni R., Jenman 692 (K). Tapacooma Cr., Jenman 6556 (K, NY). Upper Kupununi R., near Dadanawa, de la Cruz 1460 (GH, NY, US), 1726 (F, GH, MO, NY, US). Upper Mazaruni R., de la Cruz 2369 (F, GH, MO, NY, US), 2389 (F, GH, MO, NY, UC, US). Demerara R., de la Cruz 2461 (F, GH, MO, NY, US), 2640 (F, GH, MO, NY, UC, US). Pomeroon R., de la Cruz 3084 (F, GH, MO, NY, UC, US). Kamukusa, de la Cruz 2818 (NY), 2838 (F, GH, MO, NY, UC, US). Takutu Cr. to Furuni R., Mazaruni R., For. Dept. B. G. 4845, Fanshawe 2109 (COL, NY, P, S, U, US, W). Basin of Essequibo R. near mouth of Onoro Cr., A. C. Smith 2682 (A, F, G, K, MO, NY, P, S, U, US). Isherton, A. C. Smith 2476 (A, F, G, K, MAD, MO, NY, P, S, U, US). Savanna between Takutu R. and Kanuku Mts., A. C. Smith 3274 (A, F, G, IAN, K, MAD, MO, NY, P, S, U, US, W). Koriabo R., Archer 2389 (US). Arawan R., Archer 2342 (K, US). Along Potaro R. above Kaietur, Maguire & Fanshawe 23370 (A, Bk, F, G, K, MO, NY, P, K, U, US, VEN). Bartica, Sandwith 481 (K, NY, U); Jenman 4682 (K); For. Serv. B. G. 3062, Fanshawe 326 (F, K, S); For. Dept. B. G. 7036, Fanshawe 3458 (K).

Surinam: without exact locality, Pulle 527 (U); Hostmann 1304 (BM, F, FI, G, GH, K, MO, NY, P, U, US), 1304a (S). Berlijn, Focke 322 (L), 944 (U); Wulfschlagel s. n. (BK). Cottica R., Focke 105 (L), 676 (U). Paloemeu, Versteeg 889 (U); Schmidt s. n. (U). Near Republiek, Kuyper 54 (U). Patamacca, Borsboom 12263 (WAG). Wane Cr., Lanjouw & Lindeman 621 (U). Tanjimana R., Mennege 454 (U). Piaikreek, Pulle 573 (U). Nassau Mts., Lindeman & Cowan 7031 (U). Para R., Boldingh 3839 (U). Surinamskreek, Splitgerber 517 (L). Suriname R. near kabelstation, Lanjouw 1207 (U). Wilhelmina Gebergte, Zuid R., Kayser Airstrip, Irwin et al. 57507 (F, G, GH, MO, NY, P, U, US). Scotelweg, Archer 2855 (US). Simon Cr. above Carolina, Archer 2900 (US). Joden savanna, Suriname R., Kegel 1189 (GOET, NY); Lindeman 5224 (U); Donselaar 268 (U); Schulz 8638 (U); Wulfschlagel 118 (BK). Litanie R., nombouts 843 (BK, U, US); Versteeg 424 (U). Watramiri, For. Bur. Sur., Boschwegen, Herb. no. 3323 (IAN, K, MO, NY, U). Tibiti savanna, Tibiti R., Lanjouw & Lindeman 1866 (K, NY).

French Guiana: Without exact locality, Melinon 366 (P);

Gabriel s. n. in 1802 (G); Leblond 76 (G); Leprieur s. n. (G); Perrottet 26 (G,K), 27 (G), 30 (G), s. n. (G,k,P). Cayenne, Martin s. n. (P). Maroni R., Melinon 37 (Bk, F, G, L, P), 101 (k), 325 (P), 349 (A, BM, F, GH, k, NY, P, US), s. n. (k); Benoist 71 (P), Gando-ger 56 (P). Acarouany, Melinon 221 (P). "Fleuve Kourou, au village Saramacca", Oldeman B-1293 (NY, P, US). Yaroupi, 0.5 km from confluence with Rio Oiapoque, Irwin et al. 48479 (IAN, MG, MICH, MO, NY, S, SP, US, VEN). Rio Camopi, Oldeman 2537 (IAN, K, NY, P, U, US). "Pouveau Chautier", Benoist 352 (P). Gourdouville, Benoist 1679 (P). Charvein, Benoist 147 (P). Mana, Melinon 158 (P).

Brazil: Amapá: Cachoeira Utussansain, Irwin et al. 47990 (GH, IAN, MG, NY, US). Rio Oiapoque, Fróes 26644 (IAN, P, RB, US). Beira do Oiapoque, Black 49-8292 (IAN, U). Maranhão: Alto de Alegria, Snethlage 335 (F). Pará: Belém, Black & Ledoux 50-10089 (IAN); Pires & Black 394 (IAN). Ilha do Mosqueiro, Killip & Smith 30427 (NY, US). S. Miquel do Guamá, Dardano & Black 48-3157 (IAN). Cachoeira do Mangobal, Rio Tapajos, Ducke /MG no/ 16440 (BM, MG, US). Mosqueiro, Rio Pará, Ducke /KB no/ 17166 (S, US). Rio Canaticú, Ilha do Marajó, Pires 1220 (IAN, US, VEN). Belém, IAN, Archer 7648 (IAN, NY, US), 7894 (IAN, US), 8057 (P, IAN, K, NY, US); Pires 51934 (NY, k, S, US). Vigia, Ilha de Colares, Fróes 30664 (IAN). Bragança, Oliveira 6268 (MG); Huber /MG no/ 1678 (MG), 1743 (MG). Amazonas: Tapurucuara (Santa Isabel), Rio Negro between mouth of Rio Curicuriari and Barcellos, Schultes & López 8912 (F, GH, IAN, K, NY). Rio Negro, Santa Isabel, Comissão Rondon/ 22175 (N). Baía de Buiaçu, lower Rio Negro, France et al 11482 (k, MG, NY, US). Rio Negro between Ilha Jacaré and Airão, France et al 15085 (k, MG, NY, US). Rio Urubú, Sapato, Fróes 25347 (IAN, SP).

The correct epithet for this species is quinata rather than quinatum as sometimes written. Sandwith, the author of the combination, treated it as a substantive, following Aublet's citation, "Nomen Caribaeum QUINATA".

1b. MACHAERIUM QUINATA var. PARVIFLORUM (Benth) Rudd, Phytologia 24: 121. 1972.

Machaerium nervosum Vogel, Linnaea 11: 186. 1837. Type: A. Poiteau s. n., French Guiana (holotype B, destroyed).

Machaerium ferrugineum (Willd.) Persoon β parviflorum Benth in Martius, Fl. Bras. 15(1): 253. 1862, based on M. nervosum Vogel.

This variety is characterized by leaflets and flowers smaller than those of the typical variety, 8-12 mm long, commonly 10 mm long or less; calyx about 2.5-3 mm long, 2-3 mm in diameter; bracteoles 1-2 mm long, 1.5-2.5 mm wide; pubescence in general usually with shorter, more tightly crispate hairs.

Distribution: On "terra firme", sandy soil, in forest or savanna at elevations up to about 1290 m. Colombia, Venezuela, French Guiana, and Brazil.

Colombia: Vaupes: Guaracapuri Cachoeira, Río Vaupes, region E of Mitu, Allen 3378 (GH, NY, US). Soratama, Río Apaporis, Schultes & Cabrera 15155 (GH, NY, U, US); Garcia-Barriga 14118 (COL, NY). Venezuela: Amazonas: Yavita, Ll. Williams 13950 (F, G, MO, NY, US). Bolívar: Koraima, Kobt. Schomburgk 697 (BM, GH, K, P, W). Mt. Koraima district, Analiupu, along Río Arabupu, Pinkus 52 (F, G, GH, NY). SE of Santa Elena, Bernardi 6744 (NY, US). Along Río Karuai, at base of Sororopán-tepui, W of La Laja, Steyermark 60776 (F, MO, VEN). Lower part of Quebrada O-paru-má, tributary of Río Pacairao, below Santa Teresita de Kavanayán, Steyermark 60577 (F, MO). French Guiana: Saül, Mori & Boom 15353 (NY, SFV). Brazil: Amapá: Rio Oiapoque, near Mt. Carupina, Pires & Westra 48811 (G, GH, IAN, K, MG, NY, U, US, VEN). Maranhão: Assu region, Fróes 40 (US). Capoeira Assu, Cachoeira, Maracassumê R., Fróes for Krukoff 2012 (A, BM, F, G, K, MICH, MO, NY, P, S, U, US). Ilha Maranhão, capoeira, Ducke /MG no./ 361 (MG). Amazonas: Manáos, Ducke /RB no./ 24192 (S, U, US). Estrada do Aleixo, Ducke 2027 (A, COL, IAN, MG, K, U, US, VEN). Igapé de Flores, Centro Pesquisas Florestais 6095 (US). Manáos, Killip & Smith 30190 (NY, US). "Prope Panuré ad Rio Vaupes", Spruce 2400 (BM, W). Rodovia Itacoatiara - Manaus, km 19, Oliveira 3032 (IAN). Manaus, Colônia Santo Antônio, Rodrigues et al. 8696 (MG). Pará: Bragança, Campo de Cima, N. T. Silva 524 (IAN). Belém, IPEAN, Pires & Silva 10976 (IAN). Mato Grosso: Muns. Sinop & Colider, along BR 080, ca 95 km E of BR 163, Thomas et al. 4185 (NY, SFV).

There is intergradation and it is often very difficult to distinguish these two varieties. Treating them as separate might not be justified and further study is desirable. The differences are slight and could be due to edaphic conditions rather than genetic. Some collections with smaller flowers actually are immature specimens.

Local names: Acoi-yeré-yek (Venezuela); chaparillo (Venezuela); japundá (Brazil); maripa-yen-ya-pupen-yek (Venezuela); uña de murcielago (Venezuela); unha de gato (Brazil).

2. MACHAERIUM DUCKEANUM Hoehne, Fl. Brasílica 25(3): 49. 1941.

Machaerium macrocarpum Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 152. 1922, non Bentham 1840. Lectotype (here designated): A. Ducke /MG no./ 16928, Brazil, Pará, Obidos, "varzea de l'Amazona", 22 Jan. 1918 (holotype MG; isotype BM, F fragm. ex MG, G, KB, US).

Lianas or scandent shrubs; young stems ferrugineo-tomentulose, glabrescent; stipules lanceolate, striate, pubescent, usually glabrescent, 5-15 mm long, 3-5 mm wide at the base, caducous or spinescent. Leaves 9-15-foliolate, axis tomentulose, (6-) 8-27 cm long. Leaflets coriaceous, oblong, elliptic to obovate, 4-25 cm long, 2.5-11 cm wide, acute, breviacuminate, or obtuse at the apex, rounded to subcordate at the base or the terminal leaflet sometimes cuneate at the base, upper surface puberulent but glabrate at maturity, moderately pubescent with lax to crispate hairs beneath, secondary veins prominent, about 14 on each side, essentially parallel,

extending to or almost to the margin, tertiary veins scalariform-reticulate. Inflorescences terminal or axillary, racemose or paniculate, axes ferrugineo- or fulvo-tomentulose; bracts deltoid-ovate, striate, tomentulose, 4-5 mm long, 3 mm wide; bracteoles broadly ovate or semiorbicular, obtuse, 2 mm long and wide. Flowers about 9-12 mm long on pedicels (1-) 2-3 mm long; calyx ferrugineo-tomentulose, about 5-6 mm long, 4-4.5 mm in diameter; petals rose-violet, vexillum sericeous on the outer face; stamens monadelphous. Fruit wingless, lunate-reniform, fusco- or ferrugineo-tomentose, somewhat glabrescent with age, 5-6 cm long, 2-3.5 wide, stipe to about 4-5 mm long.

Distribution: Known from Colombia, Peru, and Brazil on varzea lands along the Amazon river and tributaries to about 200 m elev.

Colombia: Nariño: Rio Sequión, Mun. Iscuande, Romero-Castañeda 5474 (COL). Peru: Loreto: Nanay, south bank of river, Ll. Williams 561 (F). Río Huallago near Lagunas, Croat 17833 (MO, US). Distr. Pebas, ca 150 km ENE of Iquitos, Brillo Nuevo, Yaguasycu R., Tracy & Alcorn 140 (F, US). Brazil: Amapá: Mun. Mazagão, BR 156, 70 km WSW of Macapá toward Monte Lourado, Rio Preto, Daly et al. 3961 (SFV). Amazonas: Tonantins, inundate margin of Paraná de Tonantins, Ducke 1576 (A, F, LAN, MG, NY, K, SI, UC, US). Pará: Parará de baixo de Obidos, Ducke /MG no./ 15920 (BM, F fragm ex MG, G, MG, RB, US). Mato Grosso: Santa Anna do Chapada, Malme /Regnell II no./ 2458 (F, S), 2458a (S). Near Presidente Marques station on Madeiro-Mamoré RR., J. G. Kuhlmann /RB no./ 18199 (S, U).

Machaerium duckeanum and M. quinata can readily be distinguished by their fruit but in flower, or sterile, they are scarcely separable. Thus far there is no evidence of fruit intermediate between winged and non-winged as is the case in the complex species M. macrophyllum, for example. Should such intermediates be found it might be reasonable to consider reducing M. duckeanum to a variety of M. quinata.

3. MACHAERIUM LINDENIANUM Benth, Jour. Linn. Soc. 4, suppl.: 67. 1860. Type: J. Linden 1647, Colombia, Guajira, "San Antonio, Prov. Rio Hacha, "7000 Pds. Nevada", Jan. 1844 (holotype K as "Caracas"; isotypes BM, G, K, P, W, F neg. 32097 ex W).

Machaerium ferrugineum ? lindenianum (Benth.) Benth. in Mart. Fl. Bras. 15 (1): 253. 1862.

Delbergia lindenianum (benth.) Hoehne, Fl. Brasilica 25(3). no. 128: 8. "Fevereiro" 1941; no. 126: 19. "Julho" 1941.

Lianas; young stems ferrugineo-tomentulose, glabrescent; stipules caducous or spinescent, indurated, about 3 mm long. Leaves 5-11-foliolate, axis about 10-26 cm long, tomentulose. Leaflets coriaceous, elliptic to obovate, 3.5-10 cm long, 2-6 cm wide, obtuse to subacute at the apex, rounded to acute at the base, upper surface glabrous at maturity, lower surface moderately pubescent with laxly crispate hairs, secondary veins conspicuous, 6-12 on a side, essentially parallel, extending to the margin, tertiary veins predominantly obliquely percurrent. Inflorescences terminal, paniculate, axes ferrugineo-tomentulose; bracts lanceolate, 1-5 mm long;

bracteoles lanceolate to oblong, 1.5-2 mm long, 1 mm wide. Flowers 7-10 mm long on pedicels about 5 mm long; calyx tomentulose, 3-3.5 mm long, 2.5 mm in diameter; petals white, vexillum glabrous or slightly pubescent on the outer face; stamens monadelphous. Fruit winged, ferrugineo-pilose, glabrescent, especially on the wings, 6-7 cm long including stipe 3-5 mm long, seminiferous body 1.5-2 cm long, 1-1.3 cm wide, wing 3.5-5 cm long, 2-2.2 cm. wide.

Distribution: Known from northern Colombia and northwestern Venezuela.

Colombia: Magdalena: San Sebastián de Rábago, Romero-Castañeda 868 (COL, US). Tayronaca, Romero-Castañeda 904 (COL, MO).

Venezuela: Zulia: Dept. Colón, vicinity of Casigua El Cuba, Bunting & Fucci 8451 (US).

Hoehne transferred this species to Dalbergia and considered it a synonym of D. hypargyrea Harms, a taxon that I believe to be better placed as a variety of Machaerium floribundum.

4. MACHAERIUM NIGRUM Vogel, Linnaea 11: 188. March 1837.

Type: C. Gaudichaud s. n., Brazil, near Rio de Janeiro (holotype B "Herb. Kunth", presumably destroyed; isotypes G. F).

? Nissolia fruticosa Vellozo, Fl. Flum. text 298. 1825; Icones tab. 86. 1831 fide Bentham, non Jacquin 1780. Type not known, represented by illustration cited, Brazil, vicinity of Rio de Janeiro, "Frequentissime habitat fruticetis maritimis."

Machaerium velutinum Bentham, Comm. Legl Gen. 36. June 1837; Ann. Wiener Mus. 2: 100. 1839. Type: J. C. Mikan s. n., Brazil, Rio de Janeiro, "Fertininga", in 1817-1818 (Lectotype W; islectotypes F fragment, K).

Trees or sometimes scandent; young stems fusco- or sordido-tomentulose; stipules caducous, not spinescent, not seen. Leaves 7-17-foliolate, axis sordido-tomentulose, about 6-16 cm long. Leaflets subcoriaceous, oblong to elliptic, 3-12 cm long, 1-4.5 cm wide, acute or acuminate, base rounded to acute, upper surface puberulent, glabrate at maturity, usually darkening on drying, densely to moderately crisp-pubescent beneath, secondary veins conspicuous, about 7-12 on a side, approximately parallel, tertiary veins reticulate or subpercurrent. Inflorescences axillary or terminal, pauculate with axes tomentose; bracts sericeous, deltoid to broadly ovate, 1-5 mm long, 1-2 mm wide at the base; bracteoles ovate, about 1.5-2 mm long and wide. Flowers 7-10 mm long, sessile; calyx sordido- or fulvo-sericeous, somewhat glabrescent, strongly striate, 3.5-4.5 mm long, 2 mm in diameter; petals drying to dark violet (fide Vogel), vexillum sericeous on the outer face; stamens monadelphous. Fruit winged, essentially straight, sordid-velutinous, about 6-8 mm long including stipe 5-10 mm long, seminiferous body 1-2 cm long, 1 cm wide, wing 4-5.5 cm long, 1.2-1.8 cm wide.

Distribution: Known only from the general area of Rio de Janeiro, Brazil.

Local name: Jacarandá preto.

Brazil: Without exact locality, Capanema s. n. (RB). Itaipu /"Taipu"/. Riedel s. n. in 1833 (BM, P, US, W). Pertinanga, Riedel 1296 (P); Casaretto 1800 (G). Itaguaçu /"Taguahy"/, Bowie & Cunningham 4 (Bh.). "Itaguaçu", Pessoal do Horto Florestal /RB no./ 55666 (MO, NY, RB). "Villa de Itaguaçu", Pessoal do Horto Florestal 1630 (RB, SP). Rio de Janeiro /"Sebastianopolis"/, Schüch s. n. (Bk, M). "Atalaia", Glaziou 2534 (A, Bk, Bk, Fl, G, K, MG, NY, P, SP fragm. ex MG, UC, US). Realengo, Glaziou et al. 10564 (G, K, P). São Cristóvão, Pohl s. n. (W); Schwacke 2020 (RB). Paraíba do Sul, J. G. Kuhlmann s. n. /RB no./ 55664 (SP). M. Kuhlmann s. n. /SP no./ 37010 (SP).

This species is somewhat anomalous in section Machaerium, geographically and morphologically except for the pattern of leaflet venation, but it is convenient to follow Bentham's placement.

Bentham, himself, in 1860 reduced his M. velutinum to the prior M. nigrum. At that time and also in 1862 he cited, with a question, Nissolia fruticosa sensu Vellozo /non Jacquin/ in synonymy under M. nigrum. In the absence of voucher specimens for Vellozo's determinations the question remains moot.

5. MACHAERIUM PIRESII Rudd, Phytologia 24: 121. 1972.

Type: J. Murça Pires 577, Brazil, Amazonas, Rio Negro, Serra de São Gabriel, virgin forest, 1 May 1947 (holotype IAN; isotypes NY, US).

lianas; young stems ferrugineo-tomentulose, glabrescent. Stipules deltoid, spinescent, to about 8 mm long, 3 mm wide at the base. Leaves 7-13-foliolate, axes 15-35 cm long. Leaflets coriaceous, ovate to elliptic-oblong, or oblong-obovate, 6-17 cm long, 3-7 cm wide, acute to acuminate, rounded at the base, upper surface pubescent along the midvein, otherwise glabrous, lower surface tomentulose, secondary veins prominent, about 6-15 pairs, approximately parallel, extending to the margin, tertiary veins reticulate, inconspicuous. Inflorescences terminal, paniculate, axes tomentulose; bracts deltoid, striate, pubescent, spinescent, 7-8 mm long, 3-5 mm wide at the base; bracteoles broadly ovate, 1.5-2 mm long and wide. Flowers 5-6 mm long, essentially sessile; calyx tomentulose, 2-2.5 mm long, 1.5 mm in diameter; petals reddish, vexillum pubescent on the outer face; stamens monadelphous. Fruit winged, drying to dark brown, ferrugineo-tomentulose, glabrescent, somewhat sigmoid, 8-10 cm long including stipe about 5 mm long, seminiferous body 2.5-3 cm long, 1.2-1.5 cm wide, wing 5-7 cm long, 2-2.5 cm wide.

Distribution: Known only from forest of the Rio Negro area of Brazil.

Brazil: Amazonas: Curucuhy, Rio Negro, high forest, Fróes 22159 (IAN, U, US).

6. MACHAERIUM MACROPHYLLUM Bentham, Comm. Leg. Gen. 35. 1837.

Trees or lianas, to about 18 m tall; young stems puberulent, armen or unarmed; stipules caducous or indurated, spinescent, deltoid, acute, ascending or spreading, 3-7 mm long, 2-3 mm wide at the base. Leaves 5-9-foliolate, axes 8-20 cm long, puberulent, glabrescent. Leaflets coriaceous or subcoriaceous, obovate to elliptic, 8-24 cm long, 3-11 cm wide, usually obtuse, base rounded to acute, upper surface glabrous or puberulent along the midvein, lower surface moderately to densely pubescent with minute, appressed hairs, sometimes glabrescent, secondary veins conspicuous or inconspicuous, about 15-25 on each side, approximately parallel, mostly extending to the margin, tertiary veins relatively inconspicuous, predominantly reticulate, sometimes percurrent. Inflorescences paniculate or racemose, terminal or axillary, axes ferrugineo-tomentulose or velutinous; bracts ferrugineo-sericeous, deltoid, 3-5 mm long, sometimes spinescent; bracteoles ovate to elliptic, obtuse, 1-1.5 mm long, 1.5 mm wide, rarely linear or filiform. Flowers 5-12 mm long, essentially sessile; calyx ferrugineo-sericeous to tomentulose, 2-4.5 mm long, 1.5-3 mm in diameter, lobes 1 mm long or less; petals white to purplish, vexillum pubescent on the outer face; stamens monadelphous or sometimes splitting 5:5 at maturity. Fruit winged to reniform, fulvo- to ferrugineo-velutinous, 5-8.5 (-10) cm long including stipe 2-3 mm long, seminiferous body 1.5-4 cm long, 1-2.5 (-3) cm wide, wing 2.5-6 cm long, 1.5-4 cm wide.

6a. MACHAERIUM MACROPHYLLUM VAR. MACROPHYLLUM

Machaerium macrophyllum Bentham, Comm. Leg. Gen. 35. 1837; Ann. Wiener Mus. 2: 99. 1839; Jour. Linn. Soc. Bot. 4, suppl.: 67. 1860; /as Mart./ in Martius, Fl. Bras. 15 (1): 253, pl. 80, fig. 2. 1862. Type: C. F. P. Martius /Obs./ 3099, Brazil, "in sylvis ad fluven Solimaen provinciae Rio Negro" (holotype M).
Machaerium iquitosense Macbride, Field Mus. Bot. Publ. 23 (1): 280. 1943. Type: G. Klug 479, Peru, Loreto, Mishuyacu, near Iquitos, alt. 100 m, forest, Oct.-Nov. 1927 (holotype US, F neg. 46013 ex US; isotypes, F, NY).

Flowers about 5-8 mm long; calyx 2.5-3 mm long, 1.5-2 mm in diameter; fruit alate, straight or somewhat bent, fulvo- tomentulose or somewhat glabrescent with age, 6.5-8.5 cm long including stipe 2-3 mm long, seminiferous body 1.5-2.5 cm long, about 1 cm wide, wing 5-6 cm long, 1.5-2 cm wide.

Distribution: In forest of Amazonian Colombia, Peru, Brazil, in southern Venezuela, Guyana, and Surinam, to about 800 m elevation.

Colombia: Amazonas: Leticia, Black & Schultes 46-201 (IAN, NY, U, US, VEN); Ducke 1821 (A, F, IAN, K, MG, NY, R, US); Schultes et al 24093 (ECON, US), Schultes & Lopez 10401 f (COL, GH, US).

Venezuela: Without exact locality, Lizot 137 (VEN). Bolívar: Mouth of Río Nichare and Cicuta (Icuta), tributary of Río Caura, Steyermark & Gibson 95644 (NY, US). Amazonas: Yavita, Ll. Williams 14164 (F, G, MO, NY, VEN). Sierra Parima, vicinity of Simarawochi, Río Matusé, Steyermark 107029 (US), 107161 (US).

Depto. Atabapo, Sz bank of the middle part of Caño Yagua at Curcurital de Yagua, Davidse et al. 17449 (US). Vicinity of Culebra, Río Cunucunuma, Steevermark & Delascio 129341 (US). Depto. Río Negro, 15 km NE of San Carlos de Río Negro, Liesner 7472 (US). 1-3 km E of Cerro de Neblina base camp on Río Mawarinuma, Liesner 15763 (NY).

Guyana: Norther slope of Akari Mts. in drainage of Shodikan Cr., Essequibo R. tributary, A. C. Smith 2919 (A, F, G, K, MO, NY, P, S, U, US).

Surinam: Near Brokopondo, Donselaar 2378 (U). Between Afobaka and Brownsweeg, Donselaar 2984 (U, US). Creek forest 8 km ESE of Brownsweeg, Donselaar 2451 (U). Brokopondo, E of village, Donselaar 3066 (U), 3076 (U, US); N of village, Donselaar 3110 (U, US), 3123 (U, US). Jodensavanne - Mapane Creek area (Suriname k.) along small creek W of Camp 12, block 636, Lindeman 5231 (U).

Peru:Loreto: Maynas, ca 2-4 km from Quisto Cocha near Nauta road, McDaniel & Kimachi 18339 (MISSA, SFV).

Brazil: Amazonas: Río Negro, "sylvia Japurenhyba ad Cupati", Martius 3099 (M). "Río Negro in sylvia ad fluvium Tapura", Martius s. n. (M). Vaupes, Pires 530 (COL, IAN, NY). Içana, Fróes 22263 (COL, IAN, U).

Publications in 1837, 1839, and 1860 indicated that Bentham was the author of this species. In 1862, in Flora Brasiliensis, Martius was so cited, possibly as a matter of courtesy, or to correct an oversight in the earlier publications. However, on the basis of the original description, the correct attribution apparently should be to Bentham.

Collections without fruit are questionably identified as to variety although the flower size can also be a useful character.

6b. MACHAERIUM MACROPHYLLUM var. BREVIALATUM Rudd, Phytologia 24: 122. 1972. Type: R. Fróes 20410, Brazil, Pará, Rio Guamá, 16 Jan 1945 (holotype US; isotypes IAN, NY).

Drepanocarpus macrophyllum (Bentham, as "Mart.") Ducke, Arch. Jard. Bot. Rio de Janeiro 1: 34. 1915, sensu Ducke non basionym (apparently, erroneously based on typical Machaerium macrophyllum).

Flowers 8-12 mm long, calyx 3-5 mm long, 2.5-3 mm in diameter; fruit reniform or with a short, wide wing, ferrugineo-velutinous, somewhat glabrescent, 5-7 (-10) cm long including stipe about 2 mm long, seminiferous body 3-4 cm long, 2-2.5 (-3) cm wide, wing 2.5-3 (-6) cm long, 3-4 cm wide.

Distribution: In wet forest along river banks at or near sea level in Amazonian Brazil.

Brazil: Amapá: Rio Matapi, Macapá, Rabelo et al 1842 (SFV ex NY). Porto Grande, região da Vila Nova, Rosa 1053 (SFV ex NY). Pará: Belém. Ducke /R no./ 5394 (R), Ducke /MG no./ 15505, /RB no./ 11735 (RE), Ducke /MG no./ 15552 (MG); Pires & Black 674 (GH, IAN), 684 (GH, IAN, RB); Pires & Silva 10847 (IAN, NY); Guedes 250 (IAN), /MG no/ 1293 (G, MG, BM); Silva 347 (IAN, K, US). Belém, Bussuquara, Igapo, Pires & Black 407 (IAN), Belém, Igapó do Mocambo, Pires 10180 (IAN). Belém, João Coellio, Rio Carapará, Pereira 3348. Egler 619 (RB). Caripí, Spruce 229 (K). Caraparu, Egler 619 (MG).

Igarapé Una, Huber /MG no./ 2084 (BM, G). Ilha do Mosquero, Killip & Smith 30556 (NY, SP, US), 30644 (NY, US). Estrada Belém-Mosquero, Baía do Sol, Pires & Silva 11267 (IAN). Beira do Guamá, Black & Foster 48-3398 (IAN, US); Oliveira 3127 (IAN). Margem do Rio Guamá, Pires 2675 (IAN). Furo da Jacaraca, Guedes /MG no./ 2203 (BM, RB). Região do Anapú, Rio Maparauá, Portel, Fróes 32952 (IAN, NY). Cunaní, Huber /MG no./ 1165 (BM, MG, RB). Marajó, Rio Anabiju, Mun. de Muaná, Oliveira 3223 (IAN), 5128 (IAN). Rondônia (as Mato Grosso): Near Tabajara, upper Machado R. region, Krukoff 1424 (A, BM, G, K, MICH, MO, NY, P, S, U, UC).

Ducke interpreted collections with reniform fruit as identifiable with typical *M. macrophyllum* which, in 1915, he transferred to *Drepanocarpus*. It was an understandable conclusion; the type material and the illustration in Flora Brasiliensis show only leaves and flowers. As mentioned earlier, without fruit, determinations to variety may be questionable.

My interpretation relating alate fruit to the typical variety is largely based on geography. Collections such as Pires 530 from up-river, near the type locality, bear alate fruit. The material that Ducke studied, from the lower Amazon region, has reniform fruit, and has thus been designated as variately distinct.

There is intergradation in shape and size of fruit. Sometimes, even with fruit proper placement as to variety can be problematic. For example, Oliveira 5128 has long but wide wings unlike the typical material of either variety. I have cited it as var. *brevialatum* but further study is warranted.

Another anomalous collection is Killip & Smith 30556. Unlike in all the other collections observed, the bracteoles are linear-filiform rather than ovate to elliptic. Otherwise, the material, in fruit, appears to be referable to var. *brevialatum*.

7. *MACHAERIUM FLORIBUNDUM* Benth. Jour. Linn. Soc. 4, suppl.: 68. 1860.

Trees, shrubs, or lianas, to about 25 m high, or more; stipules spinescent, recurved, to about 8 mm long, 4 mm wide at the base. Leaves 5-11-foliolate, axes sericeous to glabrous, 8-15 cm long. Leaflets coriaceous, predominantly elliptic, sometimes ovate or obovate, (3-) 4-26 cm long, (1.8-) 2-11 cm wide, breviacuminate or obtuse at the apex, rounded at the base, glabrous above, sericeous to subglabrous beneath, secondary veins conspicuous, about 9-15 on each side, mostly about 5-15 mm apart, approximately parallel, usually extending to the margin, tertiary veins reticulate to weakly percurrent. Inflorescences terminal, paniculate, axes ferrugineo-sericeous or subsericeous; lower bracts spinous and persistent like the stipules, about 2 mm long, upper bracts deltoid-ovate, caducous, 2-5 mm long; bracteoles pubescent, ovate, 1-2 mm long, 1-1.5 mm wide. Flowers 4-10 mm long on pedicels 1 mm long or less; calyx ferrugineo-sericeous, 2-4 mm long, 1-2.5 mm in diameter;

petals pale lilac or white, vexillum usually with reddish or purplish markings, glabrous or pubescent on the outer face; stamens monadelphous, sometimes with a tendency toward separation of the vexillar filament. Fruit alate, straight or slightly curved, or, falcate-subreniform with a relatively shorter wing, ferrugineo-puberulent to glabrous, 7-9.5 cm long including stipe 3-5 (-10) mm long, seminiferous body about 2-2.5 cm long, 0.8-1.7 cm wide, wing (2-0 5-6.5 cm long, 1.3-2 cm wide.

7a. Machaerium floribundum var. FLORIBUNDUM

Machaerium floribundum Bentham, Jour. Linn. Soc. Bot. 4, suppl.: 68. 1860; in Martius, Fl. Bras. 15(1): 254. 1862. Lectotype:

R. Spruce 290, Brazil, Pará, "ad ripas fl. Amazonum, infra Santarem, Canal de Tagipuru, Oct. 1849" (hololectotype K; isolectotype W).

Machaerium fagifolium Klotzsch, Schomb. Reisen in Brit. Guiana 1205.

1848, nom. nud. Type: Richard Schomburgk 97, F neg. 2282 ex B; F fragment.

Drepanocarpus venezuelensis Pittier, Contr. U. S. Nat. Herb. 20:

122, fig. 59. 1918. Type: H. Pittier 6108, Venezuela, Miranda, El Cedral de las Adjuntas, near Los Teques, alt. 1000-1800 m, 26-28 April 1913 (holotype US; isotypes NY, P, US).

Machaerium decorticans Ducke, Arch. Jard. Bot. Rio de Janeiro 3:

150. 1922. Lectotype: A. Ducke /RB no./ 11650, Brazil, Pará, "prope fluvium Tapajos medium ad locum Francez, silva primaria", 20 Dec. 1919 (hololectotype RB; isolectotypes K, P, S, U, US).

Machaerium woodworthii Standley, Contr. Arn. Arb. no. 5: 81. 1933.

Type: R. H. Woodward & P. A. Vestal 422, Panama Canal Zone, Barro Colorado Island, shore W of Point Salud, 5 Feb. 1932 (holotype F; isotypes A, G).

Machaerium roscens Standley, Publ. Carnegie Inst. Wash. no. 461:

24. 1935. Type: W. A. Schipp 1091, Belize (British Honduras), Toledo, Big Rock, "in forest shade, 300 ft. alt.", 22 Dec. 1932 (holotype F; isotypes A, BM, G, GH, K, MICH, MO, NY, S, UC, US).

Drepanocarpus ? ovalifolius Pittier, Bol. Soc. Venez. Cienc. Nat.

7: 149. 1941. Type: E. G. Holt & W. Gehriger 242, Venezuela, Amazonas, Santa Barbara, delta of Río Ventuari, 100 m alt., 30 May 1940 (holotype VEN; isotypes GH, NY, S, US), non Machaerium ovalifolium Glaziou, nom. fere nud. 1906, nec Glaziou ex Kudd 1972.

Machaerium venezuelense (Pittier) Hoehne, Fl. Brasílica 25(3): 53. 1941.

Machaerium longistipitatum Pittier, Bol. Tecn. Min. Agr. & Cria,

Caracas, no. 5: 119. 1944. Based on Drepanocarpus ? ovalifolius Pittier, non M. longistipitatum Hoehne 1939.

Flowers about 6-10 mm long, calyx 3-4 mm long, 2-2.5 mm in diameter; leaflets sericeous to sparsely pubescent with short-appressed hairs to subglabrous beneath, hairs fulvous or ferruginous; fruit alate, straight or slightly curved, wing usually 2-4 times the length of the seminiferous body.

Distribution: In moist forest at elevations from sea level to about 2000 mm southern Mexico to Colombia, Venezuela, Guianas, northern Peru, and Brazil.

Local names: Bohori bada (Guyana); chaperno (Venezuela); nansematoto (Brazil); neupinche (México); sangre de toro (Venezuela); uña de gavilan (Venezuela).

México: Oaxaca: Río Cascabel, Mell 2224 (NY, US). Veracruz: Cerro Cintepec, Sousa 3311 (MEXU). Sontecomapa, Sousa 3523 (A, MEXU, US). Santa Rosa, road San Andres Tuxtla to Acayucan, Schubert & Rojas 1856 (A).

Belize: Toledo: Temash R., Schipp 1361 (A, BM, F, G, GH, K, MICH, MO, NY, S). El Cayo: Gorge Creek section, Humming Bird Hwy., in cohune ridge at base of hill, Gentle 8694 (LL).

Guatemala: Izabal: Quiriguá, Standley 24259 (US). Puerto Barrios, Standley 25123 (US).

Honduras: Atlantida: Lancetilla valley, near Tela, Standley 52867 (F), 54692 (A, US), 55507 (A, F, US).

Costa Rica: Alajuela: Between Río Jesus and San Ramón, Brenes 17058 (F), 17133 (F, NY). San José: El General, Skutch 4152 (A, K, MO, NY, S, US).

Panamá: Canal Zone: Barro Colorado Island, Standley 41028 (US); Wetmore & Abbe 120 (GH); Croat 10093 (MO, US), 11176 (US). Colon: East Ridge, Duke 15275 (NY, UC).

Colombia: Chocó: Without exact locality, Fuchs 21754 (US). "Hoya del Río San Juan arriba de Palestina, entre quebrada La Sierpe y El Quícharo", Forero et al. 4104 (MO). Magdalena: Near Las Nubes, H. H. Smith 2039 (BM, F, G, K, MICH, MO, NY, P, U, UC, US). Cuaco Mt., H. H. Smith 2040 (A, BM, BR, F, G, GH, L, MO, NY, P, S, US). Santander: Río Surata valley, above Surata, Killip & Smith 16600 (A, GH, K, NY, US). Meta: Villavicencia, woods along quebrada Caña-brava, Killip 34451 (BM, SP, US). Vaupes: Mitu, along lower Río Kubiýú, Zarucchi 1428 (SFV ex ECON).

Venezuela: Distrito Federal: Río San Pedro, Badillo 247 (VEN). La Quesera, middle Cotiza, above Caracas, Pittier 7134 (G, GH, SP, US, VEN). Quebradita de las Ruinas, near Caracas, Pittier 9459 (GH, NY, US, VEN). Miranda: Camino de Infiernito a Perico, Belgado 242 (US, VEN). Near Agua Fria, km. 26 on road from Caracas to Cúa, Pittier 11509 (K, US, VEN). In Mountains near El Pipe, Tamayo 2000 (VEN). Aragua: Near Colonia Tovar, Fendler 2318 (G, GH, GOET, K, MO, NY). Yaracuy: Cerro Picacho, north of Nirgua, Steyermark & Bunting 97617 (NY, US). Apure: reserva Forestal San Camilo, 6 km N of Río Mulita, Steyermark et al. 80397 (VEN), 101760 (NY, US, VEN). Lara: San Isidro, Tamayo 3363 (VEN). Tachira: Santo Domingo, airport, López-Palacios 1989 (US). Anzoátegui: Along Río Zumbador and tributary near base of Piedra Blanca, NE of Bergantín, Steyermark 61306 (F, VEN). Monagas: Base of limestone bluffs, Cerro de la Cueva de Doña Anita, S of and bordering valley of Caripe, Steyermark 61918 (F, MO, VEN). Amazonas: Alto Río Atacavi, Foldats 3775 (US, VEN). Río Orinoco, between Cerro Yapacana and Santa Barbara, Maguire et al. 42652 (G, K, MICH, MO, NY, R, US, VEN). Delta Amacuro: Boca Aragua, Gines 5142 (US). Caño Daudacana, Malave & Canales 26 (US).

Guyana: Without exact locality, Robert Schomburgk 108 (BN, K). Along Amakura R., Hitchcock 17635 (GH, NY, S, US). Morawhanna, Barina R., Hitchcock 17531 (GH, NY, US). Near Dadanawa, upper Rupununi R., de la Cruz 1443 (NY, US), 1513 (F, GH, MO, NY, UC, US). Pomeroon R., de la Cruz 3033 (F, GH, MO, NY, UC, US), 3086 (F, GH, MO, NY, UC, US), 3185 (F, GH, MO, NY, UC, US). Kamakusa, upper Mazaruni R., de la Cruz 4119 (F, GH, MO, NY, US). Mabaruma, Aruka R. Forest Dept. B. G. 5101, Fanshawe 2365 (K, NY, U, US), "edge of Euterpe swamp", Forest Dept. B. G. 5192, Fanshawe 2456 (K, NY, S, U, US).

French Guiana: Acarouany /Karouny/ Sagot 156 (K, P, W), 892 in part (F, NY, P, W). Cayenne, Sagot s. n. (BR, K).

Brazil: Without exact locality, Gomes s. n. (P). Roraima: Vicinity of Mucajai airstrip, Prance et al. 10976 (NY). Margin of Rio Mucajai, Prance et al. 11094 (K, MG, NY, US). Pará: Belém, Pires 51936 (NY, U, US); Moss 17 (US); Ducke 2030 (A, COL, IAN, MG, NY, K, SI, U, US); Burchell 9730 (K), 10082 (K, P). Belém, Tucunduba, beira do Rio Guamá, Black 52-14139 (IAN, NY). São Miguel do Guamá, beira do Irituia, Black & Foster 48-3361 (IAN, NY, US). Rio Branco de Obidos, Ducke /MG no/ 16949 (BM, F, F neg. ex B, G, MG, P, R, S, U, US, syntypes of M. decorticans). Caracará, Rio Branco, Ducke /RB no./ 24191 (SP). Amazonas: Galoruca, Rio Preto, region of Rio Negro, Fróes 28310 (COL, IAN, US). Panure, Pires & Silva 7969 (IAN). Humaitá, Pires & Rose 13278 (IAN). Goiás: Between Anapolis and Belém, km. 1179, between Colima and Araguaia, Silva 57771 (K, NY, US).

Peru: Huanuco (?) : Rio Yuyapichis, affluent to Rio Pachitea, Seidenschwarz 419/1 (SFV).

7b. MACHAERIUM FLORIBUNDUM PARVIFLORUM Benth, Jour. Linn. Soc. Bot. 4, suppl. 68: 1860; in Martius, Fl. Bras. 15(1): 254. 1862. Type: R. Spruce 4544, Peru, San Martín, Tarapoto, May 1856 (holotype K; isotypes BM, BR, C, F, F neg. 21862 ex C, G, GH, Goet, K, NY, NY, P, RB, W).

Lianas; flowers about 4-6 (-7) mm long, calyx 2-2.5 (-3) mm long, 1-2 mm in diameter, petals pale lavender, vexillum pubescent on the outer face; leaflets sericeous to moderately pubescent with appressed or subappressed fulvous or ferrugineous hairs; fruit falcate-subreniform, bent at a right angle, about 6-8 cm long, the seminiferous body and wing about equal in length.

Distribution: In wet forest at elevations of about 100-1500 m, Perú, Bolivia.

Perú: Loreto: Forteleza, near Yurimaguas, Klug 2808 (A, BM, F, GH, K, MO, NY, S, US). Iquitos, hortos dos subúrbios, Ducke /MG no/ 7499 (MG, SP). Puerto Almendros, Rio Nanay, above Iquitos, Gentry et al. 24887 (MO, SFV). Rio Nanay above Bellevista, McDaniel & Rimachi 18412 (MISSA, SFV). San Martín: San Roque, Ll. Williams 7400 (F).

Bolivia: La Paz: Mapiri region, San Carlos, Sarmpiuni, Buchtien 1781 (NY, US).

Bentham stated, "I can perceive no other difference than the smaller flowers". That seems to be the case unless the unusual fruit shape is characteristic of the variety as indicated above. The only collection with such short-winged, bent fruit is McDaniel & Kimachi 18412. Another collection from Peru, near the type locality, Ll. Williams 7400, has tiny, immature fruit, only about 5-6 mm long, that are straight. However, we cannot know what the mature size or shape would have been. Field study is needed. Yet another collection, Seidenschwarz 419/1 bears flowers in the size range of typical M. floribundum and has been cited under that variety.

7c. MACHAERIUM FLORIBUNDUM var. HYPARGYREUM (Harms) Rudd, *Phytologia* 24: 122. 1972.

Dalbergia hypargyrea Harms, *Notizbl. Bot. Gart. Berlin* 9: 973. 1926.

Type: G. Tessmann 4549, Peru, Loreto, "Oberer Marañon, Mündung des Santiago, flutfreier Hochwald," Nov. 1924 (holotype B destroyed, represented by F. neg. 2267 and fragment F ex B; isotypes F fragment ex G, G).

Lianas; flowers 4-5 mm long, calyx about 2 mm long, 1.5 mm in diameter, petals white, vexillum glabrous or lightly pubescent on the outer face; leaflets silvery sericeous beneath; fruit not known.

Distribution: In flood-plain forest, northern Loreto, Perú at elevations of about 280-350 m.

Perú: Loreto: Upper Río Marañon at mouth of Río Santiago, Tessmann 4705 (G isoparatype of D. hypargyrea). Río Corrientes at Ecuador border, between Teniente López and Puerto Avanzado, Gentry et al. 19071 (NY).

As noted under Machaerium lindenianum, Hoehne placed Dalbergia hypargyrea in synonymy under D. lindeniana (Benth.) Hoehne.

As is true of the other varieties this needs study. It may or may not be distinct from var. parviflorum, and it would be desirable to see fruit.

8. MACHAERIUM PARAENSE Ducke, *Arch. Jard. Bot. Rio de Janeiro* 3:

149. 1922. Lectotype: A. Ducke /MG no./ 16920, Brazil, Pará, Rio Tapajos, Bella Vista, on bank of Igarape, 14 Jan. 1918 (holotype MG; isotypes BM, F fragment and F neg. 28178 ex G, G, RB /as RB no. 11724/, SP fragment ex MG).

Trees, shrubs, or lianas, young stems tomentulose, glabrescent; stipules spinescent, recurved, about 2-3 mm long. Leaves 3-7-foliate, axis 4-18 cm long, pubescent with minute crispate hairs. Leaflets ovate to subelliptic, 4-15 cm long, 2-7 cm wide, usually darkening on drying, apex acuminate, base rounded to subcordate, upper surface glabrous, lower surface minutely strigose especially along the midvein or sometimes glabrous, secondary veins prominent, about 6-7 on each side, 5-25 mm apart, extending to the margin,

tertiary veins predominantly percurrent, oblique or perpendicular to the secondary veins. Inflorescences axillary or terminal, paniculate or somewhat fasciculate, axes minutely tomentulose; bracts deltoid, about 1-1.5 mm long; bracteoles elliptic to suborbicular, 5-5.5 mm long, 2-3 mm wide, ciliolate, otherwise essentially glabrous. Flowers 9-10 mm long on pedicels 1-2 mm long; calyx ciliolate, otherwise glabrous, about 4-5 mm long, 3 mm in diameter; petals lilac, vexillum pubescent on the outer face; stamens monadelphous or diadelphous 9:1 with the vexillar filament free. Fruit winged, glabrous, usually black when dry, 7.5-13 cm long including stipe 10-15 mm long, seminiferous body 2-3 cm long, 1.2-2 cm wide, wing 4-6 cm long, 2-2.7 cm wide.

Distribution: In forests along rivers on "terra firme", eastern Colombia, western Venezuela, northeastern Brazil, Surinam, and French Guiana, at elevations up to about 280 m.

Local name: Kô chiton (French Guiana, taki-taki).

Without locality: "Hb. Rudge" (BM).

Colombia: Vaupés: Río Unilla, Calamar, Cuatrecasas 7322 (COL, US).

Venezuela: Zulia: Dtto. Bolívar, carretera Maracaibo-Tolosa-El Guanábano-El Consejo, entre Tolosa y km 4 al este de Tolosa, Bunting & Stoddart 8822 (US). Apure: Reserva Forestal San Camilo, Quebrada La Azulita, SW of San Camilo (El Nula), Steyermark et al. 101587 (NY, US, VEN).

Surinam: Gonini R., Versteeg 171 (U).

French Guiana: Opposite Colonia Agricola do Oiapoque, about 4 km N of mouth of Cricu R., Irwin & Westra 47491 (F, GH, IAN, K, MG, MICH, NY, U, US). Criques Ouaqui, Grande Ouaqui, Petite Ouaqui, Lemoine 7830 (MG, NY, P in part, U). Saut Tampac, banks of R. Camopi, affluent of R. Oyapock, Oldeman 2563 (IAN, P, US). Riviere Conté 0.75 km S of Cayenne, Oldeman 1227 (P, US). Between Maripasoula and Dégrad Roches, Schnell 11716 (P, US). Near Saut Macaque, bank of Grand Ouaqui, Schnell 12111 (NY, P, R, US).

Brazil: Amapa: Rio Pontanari, Irwin et al. 47283 (IAN, MG, NY, US). About 1-3 km N of Cachoeira Tres Saltos, Irwin et al. 48208 (IAN, MG, NY, U, US). Pará: Rio Xingú, region of Volta Grande between tributaries Ambé and Tucuruhy, Ducke /RB no./ 11637 (F neg. 18300 ex B, K, P, RB, SP fragment ex RB, US isosyntypes).

Breves, Rio Macujubimzinho, Ducke /RB no./ 11638 (K, RB, S, U isosyntypes of M. paraense). Victoria, Rio Xingú, J. G. Kuhlmann 2032 /RB no./ 18196 (K, RB, S, U, US). Lageira, airstrip on Rio Maicuru, Strudwick et al. 3235 (SFV ex NY). Amazonas: Rio Negro, Barcelos, Maracá, Fróes 22073 (IAN, U). Rio Ituxi, vicinity of Boca do Curuquetê, France et al. 13995 (K, MG, NY, SFV, US).

PHYCOLOGICAL NOTES: GREEN ALGAE OF A RAINWATER POOL FROM TARRAGONA
(NE OF SPAIN)

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Abstract

Chlamydomonas carpatica, *Chlorolobion braunii* and *Chlorolobion lunulatum* have been recorded for the first time in Spain. Data concerning morphological features, habitat and distribution of species are given.

Introduction

The small blooms of green algae are very usual in temporal aquatic systems. Little seems to be known about phytogeography and ecology of these species. Most of them appears in ephemeral bodies of water and it is difficult to determine their exact distribution.

During a phycological survey carried in Tarragona (Fig. 1), we have recorded three new species for the Spanish flora (MARGALEF 1949, 1950; CAMBRA 1985; ALVAREZ COBELAS 1986): *Chlamydomonas carpatica* Ettl (*Volvocales*, *Chlorophyta*), *Chlorolobion braunii* (Näg.) Kom. and *C. lunulatum* Hind. (*Chlorococcales*, *Chlorophyta*). This species has been collected in November (1986), growing in a rain-water pool of Masarboñès (311CF693691), in Tarragona province (NE of Spain).

Description of species

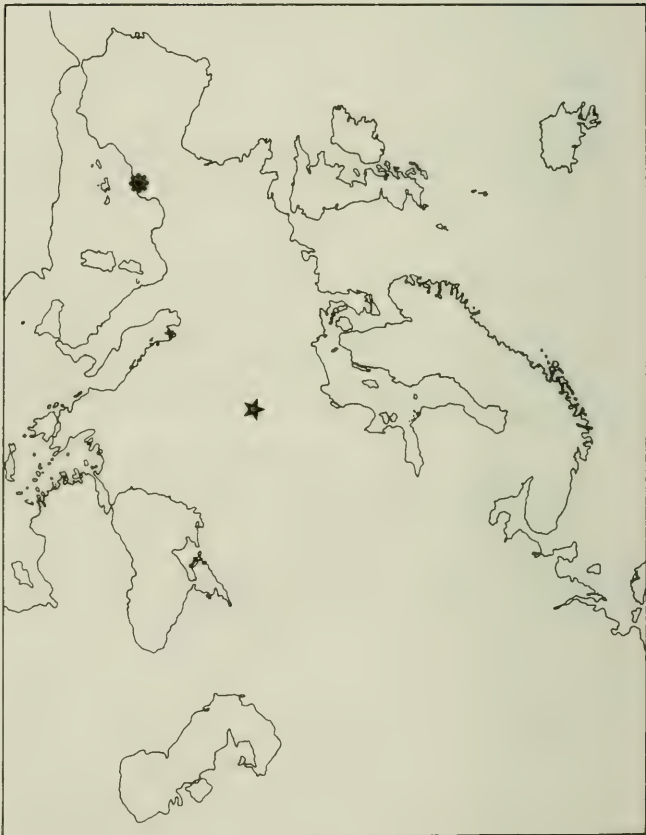
Chlamydomonas carpatica Ettl (Fig. 2,3)

The cells (15-18 μm long; 10-12 μm broad) are egg-shaped, slightly ellipsoid to pyriform. The apical papilla is truncate, with two usually emarginate apices. The flagella are as long as, or up to one and a half times longer, than the cell. There are two anterior contractile vacuoles. The chromatophore is basin-shaped and so little of the anterior end of the cell may be free. The basal pyrenoid is large and usually rather irregularly elliptical to sub-spherical. The rounded stigma lies near the pyrenoid, about in a half part of the cell. The nucleus is central.

Chlorolobion braunii (Näg.) Kom. (Fig. 2,3)

The cells (17 μm l.; 4 μm br.) are sub-lunate, straight to slightly asymmetrical, with acute apices. Chromatophore parietal,

Fig. 1: Distribution of *Chlamydomonas carpatica* and *Chlorocobion lunulatum* in the world: (✱) Iberian Peninsula and (★) Tatra mountains (Czech-Slovak).



band-shaped, lobate and with a single pyrenoid.

Chlorolobion lunulatum Hind. (Fig. 2,3)

The cells (14 μm l.; 3 μm br.) are solitary, broad-shaped, ovoid to ellipsoid. Apices are slightly rounded and with a markedly thick polar papilla. The chromatophore is parietal, band shaped, with a single pyrenoid.

Habitat

The specimens on which the present account is based developed abundantly in plankton of a rain-water pool of Masarboñes, after a period of heavy rain weather. In a few days, we have observed an important growth of green algae, where *Chlorella vulgaris* was the dominant. The pH was 7.8 and the conductivity of water was 465 $\mu\text{S}/\text{cm}$.

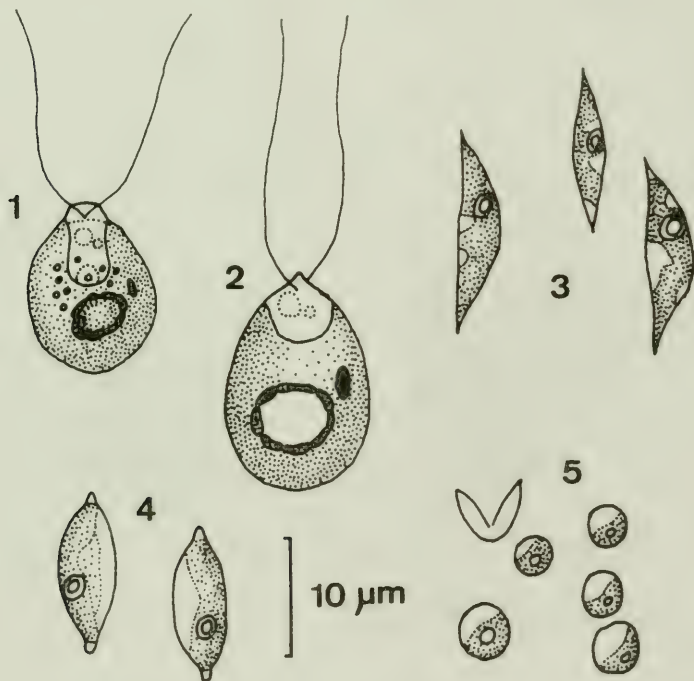


Fig. 2: (1,2) *Chlamydomonas carpatica*; (3) *Chlorolobion braunii*; (4) *Chlorolobion lunulatum*; (5) *Chlorella vulgaris*.

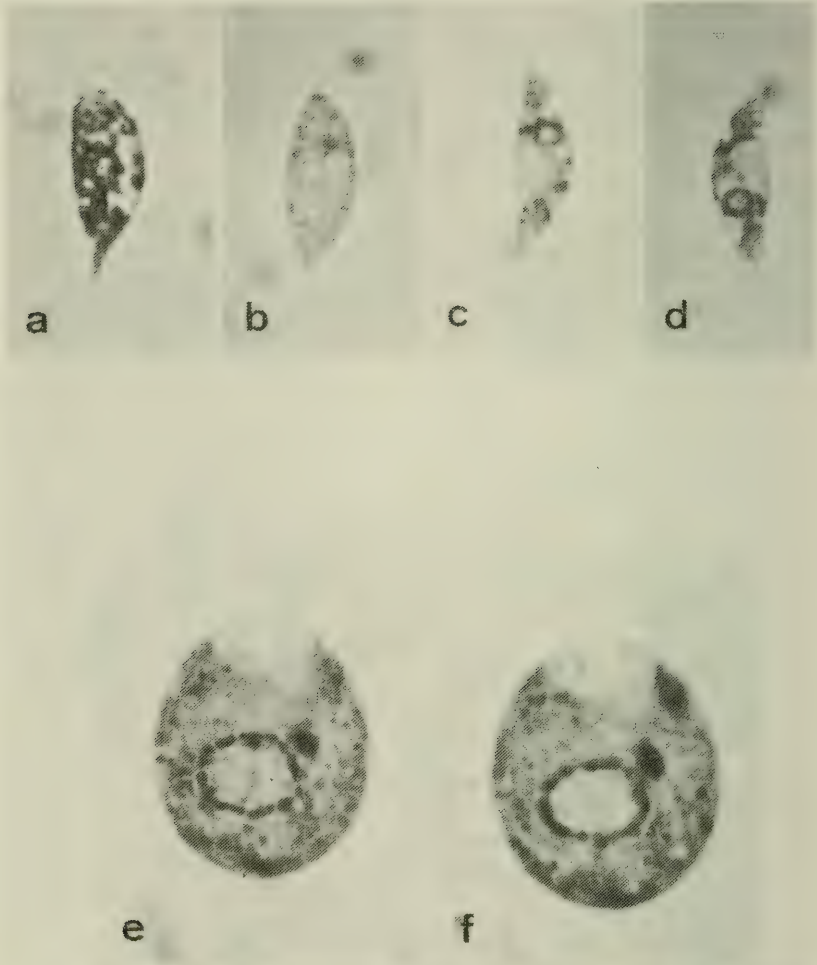


Fig. 3: (a,c,d) *Chlorolobion braunii*; (b) *Chlorolobion lunulatum*;
(e,f) *Chlamydomonas carpatica*.

Distribution

Our records of *Chlamydomonas carpatica* and *Chlorolobion lunulatum* are the second observation of these species in the world, after original description of Ettl (1976) and Hindak (1970), respectively. On the other hand, *Chlorella vulgaris* and *Chlorolobion braunii* are cosmopolite species (Komarek et al., 1983).

Untill now, *Chlamydomonas carpatica*, *Chlorolobion braunii* and *C. lunulatum* are considered to be rare in Spain. *C. carpatica* was found in a small hollow wich are intermittently filled by rain-water in Tatra Mountains (Czech-Slovak). On the same way, *C. lunulatum* has been recorded in Tatra, after a soil culture (Fig. 1).

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NOTES ON THE GENUS CLERODENDRUM (VERBENACEAE). XXXIV

Harold N. Moldenke

CLERODENDRUM Burm.

Additional synonymy: *Volkamaria* Burm. ex Nemnich, Allgem. Polyglott. Lex. 1: 1066 sphalm. 1791.

Additional & emended bibliography: L., Mant. Pl., imp. 1, 2: 423 & 515. 1771; W. Hook., Bot. Misc. 1: 283--284. 1829; Géel, Sert. Bot. Cl. 2: 13 & 14. 1832; Jack in Griff., Calcut. Journ. Nat. Hist. 4: [Descrip. Malay. Pl., imp. 5] 16--17, 38--40, & 48--49. 1843; Dura, Gard. Chron., ser. 1, 5: 433. 1845; Lindl., Gard. Chron., ser. 1, 5: 154 & 435. 1845; Jack, Malay. Misc., imp. 2 [Descrip. Malay. Pl., imp. 6], 1: 16--17. 1877; Skeat, Malay. Magic 79 & 236. 1900; S. Moore in Baker, Moore, & Rendle, Journ. Linn. Soc. Lond. Bot. 37: 197--198 (1905) and 37: 562. 1906; Gibbs, Journ. Linn. Soc. Lond. Bot. 37: 464. 1906; Maxwell, Journ. Roy. Asiat. Soc. Straits 45: 32, 37, & 51. 1906; C. B. Robinson, Philip. Journ. Sci. Bot. 3: 305. 1908; E. D. Merr., Philip. Journ. Sci. Bot. 3: 431--432. 1909; Fiori, Agric. Colon. Ital. 5: Suppl. 100--101. 1911; Fiori, Buschi Piante Legn. Eritrea [Bibl. Agr. Colon. 7:] 323--324. 1912; E. D. Merr., Philip. Journ. Sci. 21: 533. 1922; Wangerin, Justs Bot. Jahresber. 56 (1): 668--669. 1936; Hutchinson & Bruce in Gillett, Kew Bull. 1941: 177. 1941; Glover, Prov. Check List Brit. Ital. Somal. 20, 23, 50, 57, 260, 266--267, 342, 355, 407, & 413. 1947; W. Robyns, Fl. Sperm. Parc Nat. Albert 2: 140--148, pl. 14. 1947; Alain, Rev. Soc. Cub. Bot. 13: 33. 1956; Conde, Hist. Bot. Cuba 218. 1958; Langsdale-Br, Osmoston, & Wils., Veg. Uganda 25 & 112. 1964; W. C. Burger, Haile Sellas. Univ. Exp. Sta. Bull. 45: 198, fig. 60 (2 & 3). 1965; Bosler, Journ. Ecol. Bot. 54: 473. 1966; W. C. Burger, Fam. Flow. Pl. Ethiop. 198, fig. 60 (2 & 3). 1967; Seaforth, W. Afr. Journ. Biol. Appl. Chem. 7: 29 & 30. 1967; Astle, Kirkia 7: 89 & 95. 1968; Glover, Stewart, Fumerton, Marindany, & Anderson, Gloss. Bot. Kipsig Names, ed. 2, 223, 232, 233, 259, & 264. 1969; Lind & Tallantire, Some Comm. Flow. Pl. Uganda, ed. 2, 145--147, [151], 238, 243, 253--255, & 259, fig. 90. 1971; Innamorati, Webbia 28: 107. 1973; Ament, Journ. E. Afr. Nat. Hist. Soc. Nat. Mus. 154: 25. 1975; B. C. Stone, Henderson's Malay. Wild Fls. Append. 16. 1977; Buck, Bull. Torrey Bot. Club 113: 464. 1986; Mold., Phytologia 62: 184--206. 1987.

Sydow (1922) records the fungus, *Meliola sarawakensis* P. Henn., as infesting the leaves of an unidentified species of *Clerodendrum* on the island of Celebes, based on C. B. Robinson 2466.

An additional excluded species is: *Clerodendron odoratum* Roxb. apud Wall., Numer. List [49], no. 1812. 1829 = *Caryopteris odorata* (Hamilt.) B. L. Robinson.

CLERODENDRUM MELANOCRATER Gürke

Additional & emended synonymy: *Premna melanophylla* S. Moore in

Baker, Moore, & Rendle, Journ. Linn. Soc. Lond. Bot. 37: 196--197. 1905. *Clerodendron melanophyllum* (S. Moore) S. Moore, Journ. Bot. Brit. 45: 93. 1907.

Additional bibliography: S. Moore in Baker, Moore, & Rendle, Journ. Linn. Soc. Lond. Bot. 37: 196--197 (1905) and 37: 567. 1906; S. Moore, Journ. Bot. Brit. 44: 89 (1906) and 45: 93. 1907; Mold., Phytologia 62: 189--191. 1987.

Moore's *Premna melanophylla* is based on Bagshawe 141a from a swamp at the mouth of the Bakore River, Uganda; in his 1906 work Moore cites also Bagshawe 685, which he states is a "finer" specimen than the one on which he based his description and on the basis of which he modified his original description. In his 1907 work he says: "This plant, with its relatively long and slender [corolla] tube and exserted stamens, is certainly not a *Premna*, although it agrees with that genus in habit rather than with *Clerodendron*". He suggests that it is "no doubt allied" to *Premna macrosiphon* Baker [now known as *Clerodendrum thomasii* Mold.]. Bagshawe notes that his no. 685 collection was "a climber in forest".

CLERODENDRUM MINAHASSAE Teijsm. & Binn.

Additional bibliography: Sydow, Philip. Journ. Sci. 21: 146 & 601. 1922; Mold., Phytologia 62: 200--206. 1987.

Sydow (1922) records the fungus, *Meliola sarawakensis* P. Henn., as infesting the leaves of "*Clerodendron (minahassae?)*" on the basis of C. B. Robinson 2509.

The following collections, originally identified and distributed as typical *C. minahassae*, are regarded by me as representing, instead, its var. *brevitubulosum* H. J. Lam: Bartlett 15292 & 15299, Elmer 18078, Lohr 12607, McGregor, Herb. Philip. Bur. Sci. 43554 & 44527, Merrill 332, Ramos & Edaño, Herb. Philip. Bur. Sci. 43962 & 49222, Read 1255, Renner s.n. [29.11.1930], Rogerson 1085, Sulit, Philip. Nat. Herb. 6262, Sullivan 1115, Wenzel 2839 & 3400, and Zwicky 198. However, Wenzel 83 & 261 are regarded by me as var. *grandicalyx* Mold., while C. B. King s.n. [July 1969] is *C. trichotomum* var. *ferrugineum* Nakai.

The Philippine collections cited below are placed here tentatively -- it is possible that further study may show that they may, in part, at least, be better regarded as representing var. *brevitubulosum* H. J. Lam.

Citations: MALAYA: Singapore: Furtado s.n. [March 31, 1928] (Ca--360672). PHILIPPINE ISLANDS: Basilan: Reillo, Herb. Philip. Bur. Sci. 16086 (Cm). Busuanga: Fénix, Herb. Philip. Bur. Sci. 15639 (Cm). Jolo: Kienholz, Herb. Philip. Bur. Sci. 15521 (Ca--262880); Ramos & Edaño, Herb. Philip. Bur. Sci. 44434 (Ca--257647). Luzon: Cuming 1573 (X), 1644 (L, X), 1688 (L, X). GREATER SUNDA ISLANDS: Celebes: Blinnemeijer 10776 (Bz--20062, Bz--20063, Ca--235846), 10892 (Bz--20049); Curran 3459 [photo B & W 94, Col. 46 (4.5)] (A); Kaudern 499 (Ac, N), Kjellberg 59 (Bz--20081, S), 1797 (Bz--20048, S); Koorders 18611b [3365] (Bz--20073), 19513b (Bz--20079), 19514b [2045] (Bz--20080), 19515b (Bz--20069, Bz--20070, Bz--25534, N), 19516b [87] (Bz--20075), 19517b [3365] (Bz--20071), 19518b [2242]

(Bz--20072), 19519b (Bz--20077), 19521b [71] (Bz--20074, Bz--20076), 19522b (Bz--20063), 19523b [1670] (Bz--20073); *Noerkas* 194 (Bz--20060), 299 (Bz--20061), 455 (Bz--20058, Bz--20059); *Rachmat* 25 (Bz--20052, Bz--20053); *Riedel* s.n. [Gorontalo] (Bz--20067), s.n. [1874] (Mu, Mu); *Teijsmann* 5298 H.B. (Bz--20054--cotype), 5774 (Bz--20066--cotype, Ld--photo of cotype, N--photo of cotype), 5868 (Bz--20055--cotype, Ut--43903--cotype), 12146 (Bz--20064, Bz--20065). Saleba-boe: *Lam* 3047 (Bz--20082, Bz--20083, Bz--25533, N). LESSER SUNDA ISLANDS: Soemba: *Grevenstuk* 180 (Bz--20955). MOLUCCA ISLANDS: Tali-aboe: *Hulstijn* 179 [Atje 179] (Bz--20030, Bz--20031, Bz--20032), 417 [Atje 417] (Bz--20023, Bz--20024). CULTIVATED: Cuba: *Salvoza* 614 (A). Florida: *Buswell* s.n. [June 5, 1943] (Bu, Ws); *Dress* 1267 (Ba); *C. Ferris* s.n. [August 17, 1970] (E--2052941, E--2052942, E--2052943); *Gillis* 7985 (Ba), 9965 (Ld); *Loomis* s.n. [Plant Introd. 137954] (N); *R. E. Matthews* s.n. [D. Fairchild 3459] (N); *Pancho* 1606 (Ba). Java: *Herb. Hort. Bogor.* XI.5.22 (Bz--26538), XI.G.107 (Bz--25806, Bz--25807, N), XI.I.22 (Bz--25823, Bz--25824, Bz, Bz, Bz, N), XI.I.22a (Bz--20056), XI.I.22a (Bz, N), XV.J.A.XXXIII.3 (Bz--26389, Bz--26390, Bz--26539, Bz, Bz, N), XV.L.1 (Bz--26474, Bz--26475, Bz, Bz, N), XV.L.1a (Bz--26476, Bz--26477, N); *Koorders* 21919b (Bz--20028, Bz--20029, Bz--25535, Ca--265984); *Teijsmann* s.n. [Hort. Bogor. 1868] (K); *Van Steenis* 4043 (Bz--20025); *Vorderman* s.n. (Bz--20027); *Wisse* 967 (Bz--20026). Netherlands: *Herb. Hort. Bot. Ultr. s.n.* [Dec. 1903] (Ut). Penang: *Mahmud* BOS.6366 (K1--6748). Pennsylvania: *J. W. Peterson* J.585 [Longw. Gard. Acc. 583] (Ba). Sri Lanka: *Collector undetermined* s.n. [Roy. Bot. Gard. Perad. February 1888] (Pd); *Moldenke, Moldenke, & Jayasuriya* 28168 (W); *Sumithraarachchi & Sumithraarachchi* DBS.78 (W--2803409). LOCALITY OF COLLECTION UNDETERMINED: *Marconcz* s.n. [10.VIII.26] (L), s.n. (L). MOUNTED ILLUSTRATIONS: *Corner & Watanabe*, Illust. Guide Trop. Pl. 755. 1969 (Ld, Z); *Koord.*, Ann. Jard. Bot. Buitenz. 14: pl. [21] (Ld) & 22 [anat.]. 1896 (Z); *H. N. Moldenke* color slide 100 (Ld).

CLERODENDRUM MINAHASSAE var. *BREVITUBULOSUM* H. J. Lam, Verbenac.

Malay. Arch. 315 [as "*Clerodendron*"]. 1919; Mold., Known Geogr.

Distrib. Verbenac., ed. 1, 62 & 90. 1942.

Synonymy: *Clerodendron fortunatum* Blanco, Fl. Filip., ed. 1, 508--509. 1837 [not *Clerodendron fortunata* L., 1756, nor *Clerodendron fortunatum* Retz, 1772, nor Vent., 1819, nor *Clerodendron fortunatum* Buch.-Ham., 1831, nor Blume, 1844, nor Burm., 1962, nor *Sesé & Moc.*, 1894, nor Wall., 1885]. *Clerodendron blancoi* Naves in Blanco, Fl. Filip., ed. 3, pl. 223. 1878. *Clerodendron minahassae* Merr., Bull. Govt. Lab. Philip. 35: 62 in syn. 1906 [not *Clerodendron minahassae* Teijsm. & Binn., 1863]. *Clerodendron minahassae* ? H. J. Lam, Verbenac. Malay. Arch. 363. 1919. *Clerodendron plancoi* Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 20 sphalm. 1936. *Clerodendron blancoi* ("Naves ex Villar" apud Fedde & Schust., Justs Bot. Jahresber. 60 (2): 572 in syn. 1941. *Clerodendron blancoi* Merr. ex Mold., Phytol. Mem. 2: 384 in syn. 1980.

Bibliography: Blanco, Fl. Filip., ed. 1, 508--509 (1837) and ed. 2, 355. 1845: Fern.-Villar & Naves in Blanco, Fl. Filip., ed. 3, 4:

Nov. App. 161 (1878) and ed. 3, 6: pl. 223. 1878; Pardo de Tavera, Pl. Med. Filip. 241-242, 329, 332, & 337. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 560. 1893; E. D. Merr., Philip. Journ. Sci. 1: 173 (1906) and Suppl. 1: 122. 1906; E. D. Merr., Philip. Govt. Lab. Publ. 35: 62--63. 1906; Backer, Tropische Natuur 5: 88. 1916; E. D. Merr., Sp. Blanc. 334. 1918; H. J. Lam, Verbenac. Malay. Arch. 248, 315, & 363. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 85, 86, 108, & viii. 1921; Stapf, Ind. Lond. 2: 238 (1930) and 6: 544. 1931; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 20. 1936; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 572. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 62 & 90. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 560. 1946; H. N. & A. L. Mold., Pl. Life 2: 50. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 141 & 182. 1949; Mold., Résumé 183, 195, 260, 263, & 451. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 560. 1960; Mold., Fifth Summ. 1: 316, 322, 359, 440, & 445 (1971) and 2: 869. 1971; Mold., Phytologia 34: 269. 1976; Mold., Phytol. Mem. 2: 306, 313, 350, 384, & 540. 1980; H. N. & A. L. Mold. in Dassan. & Fosb., Rev. Handb. Fl. Ceyl. 4: 443. 1983; Mold., Phytologia 59: 469 (1986), 60: 282 & 495 (1986), 61: 178 (1986), and 62: 204 & 205. 1987.

Illustrations: Fern.-Villar & Naves in Blanco, Fl. Filip., ed. 3, 6: pl. 223 (in color). 1878.

This variety differs from the typical form of the species in having its calyx during anthesis 2.5--3.5 cm. long and the corolla-tube 5--8.5 cm. long.

The variety is based on the *Clerodendron fortunatum* of Blanco (1837) which he describes as follows: "*Clerodendron Fortunatum*. *Clerodendro* dichoso. Tronco casi redondo. Hojas opuestas, aovadas oblongas aguzadas, enteras y apenas pelosas. Flores terminales en panojas umbeladas, con las ramas opuestas, y en cada umbela tres florecitas. Involucro de la umbelita, una hojuela en la base del pedunculo, y dos en el extremo. Propio de la florecita, dos hojuelas alesnadas. Cal. de color garzo, largo, tubulado, algo hinchado en el medio, y en cinco partes. Cor. dos veces mas larga que el caliz, con el tubo filiforme, y el limbo con cinco lacinias casi iguales. Estam. didinamos, fijos acia las divisiones mas profundas de la corola, y siguen acia abajo pegados al tubo. Filam. mas largos que la corola. Ant. hechas. Germen conico. Estilo del largo de los estambres. Estigma bifido. Baya seca, cuadrada, deprimida, con la corteza dura, cuatro canales, otros tantos aposentos, y en cada uno una semilla. = Arbusto que se eleva á la altura de dos brazas á lo mas. Algunos indios le conocen, y es frecuente en los bosques. Sus flores que son un poco amarillas, cuando estan secas, tienen el olor mas bien grato, que fastidioso. El nombre dichoso de la especie, esta tomado de una vana creencia de los naturales de la india. Asi como llamen á otre especies desventurada, porque piesen que cortando alguna flor, han de quebrar alga utensilio en su casa. * T, Casopañgil gubat."

Merrill (1906) describes the Philippine plant as follows: "A shrub or small tree 2 to 7 m. high, glabrous or nearly so, with ob-

long ovate, acuminate leaves, terminal, few-flowered panicles, the calyces inflated, tubular, 2 to 2.5 cm. long, the corolla tube slender, 5 cm. long, slightly puberulent. Branches gray or brown, lenticellate, glabrous or nearly so. Leaves opposite, 9 to 20 cm. long, 5 to 11 cm. wide, the base rounded or obtuse, the apex short acuminate, the margins entire, glabrous or nearly so; nerves about 12 on each side of the midrib; petioles glabrous, 3 to 7 cm. long. Panicles few flowered, simple, glabrous or slightly pubescent, the branches few, 2 to 2.5 cm. long, each bearing three flowers. Flowers fragrant, white or cream colored. Calyx slightly pubescent, green, often tinged with purple, about 6 mm. in diameter, somewhat dilated in the middle, 5 cleft, the teeth oblong ovate, about 8 mm. long. Corolla tube slender, exserted, the limb spreading, 5-cleft, the lobes oblong 1.5 to 2 cm. long. Stamens equaling the lobes. Calyx in fruit cleft half way to the base, enlarged, green outside, red within, the fruit globose, about 1 cm. in diameter, deep blue." He cites Ahern 586, Ahern's Collector 1153, Borden 1609 & 1915, Guerrero 13, Leiberger 6012 & 6115, Merrill 2707, 2838, 2938, 3089, & 3866, and Whitford 418 from Luzon in the Philippine Islands.

He comments that "Although the name *Clerodendron blancoi* Naves, is published in the places cited above, without a description and without reference to other species as synonyms, yet the plate so named by Naves, enables us at once to identify the species, and the reference by F.-Villar, of this plate, with *Clerodendron fortunatum* Blanco, to *Clerodendron infortunatum*, shows the species of Blanco, which Naves intended his plate to represent. This name was published before *Clerodendron blancoanum* F.-Villar., and although without a description, we are of the opinion that the citation of the name as a synonym, by F.-Villar, should be considered a valid publication, and the name retained rather than to adopt a new name for this common species. *Clerodendron blancoanum* F.-Villar., although well described by that author, is a synonym of *Clerodendron quadriloculare* Merrill (*C. navesianum* Vidal.)."

The pounded leaves of *C. minahassae* var. *brevitubulosum* are used in native medicine in the Philippines to relieve bone-ache from fatigue.

It may be worth noting here that the *Clerodendron fortunatum* accredited to Buchanan-Hamilton and to Wallich in the synonymy (above) belong in the synonymy of *Clerodendrum fortunatum* L., the homonym credited to Blume is *C. indicum* (L.) Kuntze, that credited to Sessé & Mocino is *C. ligustrinum* (Jacq.) R. Br., and that accredited to Burman is *C. serratum* (L.) Moon; the *Clerodendrum fortunatum* credited to Retz and to Ventenat are *C. fortunatum* L.

Lam (1919) cites for *C. minahassae* var. *brevitubulosum* only Forsten 9, Weber, Herb. Lugd.-Bat. 908.266-115, and Zippel, Herb. Lugd.-Bat. 908.266-69 from Celebes and three Teijsmann & DeVriese collections which he admits may be typical *C. minahassae* rather than this variety. He cites, also from the Philippines, apparently without any doubts: Curran 17443, McGregor 10267, Merrill 332 & 491, Ramos 14729, Robinson 11778, and Tomacio 20042.

Loher 4407 is said to be a perfect match for Cuming 1644.

Material of *Clerodendrum minahassae* var. *brevitubulosum* has most often been distributed in herbaria as typical *C. minahassae* Teijsm. & Binn. or even as *C. simile* Merr.

Citations: PHILIPPINE ISLANDS: Basilan: Ebalo 866 (Mi). Biliran: R. C. McGregor, *Herb. Philip. Bur. Sci.* 18632 (W--1010581), 18717 (W--898122). Leyte: Glissman 606 (Ur), 709 (Ur). Luzon: Adduru 52 (W--1091724); Ahern's Collector, *Merr. Dec. Philip. For. Fl.* 162 (It, Mi, Os, W--1584132), *Herb. Philip. For. Bur.* 1915 (Bz--20045), 3135 (N, W--627095); Bartlett 14544 (Mi), 14726 (Mi, Ws), 15292 (Ca--164147, Mi, N), 15299 (Bi, Ca--164250, Mi, N), 15345 (Mi); Borden, *Herb. Philip. For. Bur.* 1609 (N, W--625487), 1915 (Bz--20044, N, W--850771); Dnes, *Herb. Philip. For. Bur.* 31931 (N); Elmer 18078 (Bi, Bz--20037, Ca--271407, N, S, Um--155, Ut--71528, W--1237547); Fénix 13 (Bz--20046, L); Fox 248 [*Philip. Nat. Herb.* 4693] (Mi); Lohr 4406 (Mu), 4407 (W--446864), 4410 (W--446865), 12607 (Ca--240069, Mu--4342); Mangubat, *Herb. Philip. Bur. Sci.* 1360 (N); R. C. McGregor, *Herb. Philip. Bur. Sci.* 43554 (Ca--237690), 44537 (Ca--256657); E. D. Merrill 332 (Mu--4185, Ut--22259, W--1178290), 2707 (N), 2838 (N, W--437808), 2938 (W--437910), 3089 (N, W--438060), 3866 (N, W--438934); Otanes, *Herb. Philip. Bur. Sci.* 17981 (W--1238453); M. Ramos, *Merr. Sp. Blanc.* 80 (Bz--20043, N, W--903747), 432 (Bz--20042, N, W--904109); Ramos & Edaño, *Herb. Philip. Bur. Sci.* 29472 (Bz--20036); Rogerson 1085 (It, W--1940728, W--1940729); Whitford 418 (N, W--851598); R. S. Williams 358 (N). Malamaui: Miranda, *Almagro, & Benito, Herb. Philip. For. Bur.* 18878 (Bz--20040). Mindanao: Ahern 568 [field no. 397] (W--445827); Quadras 397 (W--1584674); M. Ramos, *Herb. Philip. Bur. Sci.* 14729 (Cm, N); Ramos & Edaño, *Herb. Philip. Bur. Sci.* 36727 (Bz--20035), 37003 (Bz--20041), 49222 (Ca--324187); C. B. Robinson, *Herb. Philip. Bur. Sci.* 11778 (Bz--20038); Wenzel 2839 (B, Ca--317005), 3400 (Ca--354918); R. S. Williams 2135 (N, N, N, W--707839), 2923 (N, N); Zwickey 193 (Mi, N), 207 (Mi). Mindoro: Conklin 267 [*Philip. Nat. Herb.* 18681] (W--2214831). Palawan: Bermejós, *Herb. Philip. Bur. Sci.* 318 (Bz--20039, W--439420). Samar: Sulit, *Philip. Nat. Herb.* 6262 (Mi, W--2125703). Tawitawi: Ramos & Edaño, *Herb. Philip. Bur. Sci.* 43962 (B, Ca--257646, S). GREATER SUNDA ISLANDS: Celebes: Rachmat 821 (Bz--20050, Bz--20051); Veearts Donggala 27 (Bz--20057); Waturandang Cel./V. 295 (Bz--20047, Bz--25532). CULTIVATED: Florida: R. W. Read 1255 (Ft--2193); V. I. Sullivan 1115 (Ft--2192, Ft). Java: Renner s.n. [29.11.1930] (Mu).

CLERODENDRUM MINAHASSAE var. *GRANDICALYX* Mold., *Phytologia* 23: 315. 1972.

Bibliography: Anon., *Biol. Abstr.* 54 (7): B.A.S.I.C. S.53. 1972; Mold., *Phytologia* 23: 315. 1972; Hocking, *Excerpt. Bot. A.* 23: 291. 1974; Mold., *Phytol. Mem.* 2: 307 & 540. 1980; Brenan, *Ind. Kew. Suppl.* 16: 71. 1981; H. N. & A. L. Mold. in Dassan. & Fosb., *Rev. Handb. Fl. Ceyl.* 4: 443. 1983; Mold., *Phytologia* 62: 205. 1987.

This variety differs from the typical form of the species in having its calyx during anthesis to 4 cm. long and the corolla-tube to 11 cm. long.

The variety is based on *Chester A. Wenzel 261*, collected sometime in 1913 on the island of Leyte, Philippine Islands, and deposited in the United States National Herbarium in Washington.

The variety has been collected in anthesis in March. Material has been distributed to some herbaria as typical *C. minahassae* Teijsm. & Binn.

Citations: PHILIPPINE ISLANDS: Leyte: *Wenzel 83* (W--1171887), 261 (W--713908--type).

CLERODENDRUM MINDORENSE Merr., Philip. Journ. Sci. Bot. 7: 342 [as "*Clerodendron*"]. 1912; Mold., Alph. List Comm. Vern. Names 4. 1939.

Synonymy: *Clerodendron simile* Merr., Govt. Lab. Publ. Philip. 35: 64. 1906 [not *Clerodendron simile* H. H. W. Pearson, 1901]. *Clerodendron mindorensense* Merr., Philip. Journ. Sci. Bot. 7: 342. 1912. *Clerodendron mindoroense* Merr. ex Bakh. in Lam. & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 73 & 78. 1921. *Clerodendron mindoraense* Merr. ex Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: ix sphalm. 1921. *Clerodendron mindorensis* Merr. ex Mold., Alph. List Inv. Names Suppl. 1: 6 in syn. 1947. *Clerodendron similis* Merr. ex Mold., Phytol. Mem. 2: 389 in syn. 1980.

Bibliography: E. D. Merr., Govt. Lab. Publ. Philip. 35: 64. 1906; Prain, Ind. Kew. Suppl. 3, imp. 1, 45. 1908; E. D. Merr., Philip. Journ. Sci. Bot. 7: 342. 1912; Fedde & Schust., Justs Bot. Jahresber. 40 (2): 335. 1915; H. Hallier, Meded. Rijks Herb. Leid. 37: 75. 1918; H. J. Lam, Verbenac. Malay. Arch. 309 & 364. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 73, 78. 110, & ix. 1921; Prain, Ind. Kew. Suppl. 5, imp. 1, 61. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 404. 1923; Mold., Alph. List Comm. Vern. Names 4. 1939; Mold., Prelim. Alph. List Inv. Names 21. 1940; Mold., Alph. List Inv. Names 19 & 20. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 62 & 90. 1942; Mold., Phytologia 2: 100. 1945; Mold., Alph. List Cit. 1: 225 & 249. 1946; Mold., Alph. List Inv. Names Suppl. 1: 6. 1947; Mold., Alph. List Cit. 2: 403 & 462 (1948) and 3: 659, 721, 747, & 969. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 141 & 182. 1949; Prain, Ind. Kew. Suppl. 3, imp. 2, 45. 1958; Mold., Résumé 183, 267, 269, & 451. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 61. 1960; Mold., Fifth Summ. 1: 316, 451, & 455 (1971) and 2: 869. 1971; Mold., Phytol. Mem. 2: 307. 389, & 540. 1980; Mold., Phytologia 58: 404 (1985), 59: 343 & 409 (1986), 61: 410, 415, & 416 (1986), and 62: 130. 1987.

A shrub, 0.5--1.5 m. tall; stems to 2 cm. in diameter; branches light-gray, glabrous; leaves decussate-opposite; petioles 2--8 cm. long, glabrous; leafblades membranous, lanceolate to ovate-lanceolate, 13--20 cm. long, 3--8 cm. wide, apically short-acuminate, marginally entire, basally acute and 3-veined; secondaries about 7 per side, rather prominent beneath; flowers in dense terminal clusters or masses, the inflorescence paniculate, minutely puberulous, its ramifications 3-flowered; bracts and bractlets subulate, 1--3 mm. long; calyx infundibular, 5 mm. long, externally minutely and sparingly puberulent, apically 5-toothed, the teeth 1.5 mm. long,

apically acute; corolla hypocrateriform, white or pink, 3 cm. long, the tube very slender, basally puberulent, the lobes spreading, oblong, 6 mm. long, 2 mm. wide, apically acute to obtuse; stamens about equaling the corolla-lobes; anthers 2 mm. wide; ovary globose, externally glabrous.

This species is based on *E. D. Merrill 1192* from Baco, Mindoro, Philippine Islands, collected in January of 1903. Merrill (1903) comments that this is "A species with the general appearance of *Clerodendron quadriloculare*, differing from the latter in its much shorter flowers".

Collectors have found this plant growing in wooded parang, at the edges of cultivated areas, on hills, and in forests by streams, at altitudes of 50--600 m., in flower in January, April, and September, and in fruit in February, April, May, and December. Kienholz found it "in cleared land which has grown back to weeds" on Mindoro.

The corollas are described as having been "white" on *Ramos, Herb. Philip. Bur. Sci. 46418* and as "pink" on *Bartlett 13642* and *Kienholz 59 & 172*. Vernacular names reported for the species are "bagab" and "bagáuak".

A key to help distinguish this species from Indonesian taxa will be found under *C. klemmei* Elm. in the present series of notes [61: 410--415].

The *C. simile* of Pearson, referred to in the synonymy (above) is a synonym of what is now known as *C. ternatum* Schinz, which see.

Merrill (1906) cites for *C. mindorense*, besides the type collection, also *Merrill 1234* from Mindoro and *McGregor s.n.* from Semirara. In his 1921 work he refers to the species as "Endemic...In primary and secondary forests at low altitudes: and cites *Curran, Herb. Philip. For. Bur. 17421*, *Elmer 15494*, *McGregor 210 & 273*, *Merrill 1192 & 1234*, and *Merritt, Herb. Philip. For. Bur. 4043, 6142, 6186, & 6897* from Luzon, Mindanao, Mindoro, Negros, and Semirara.

Material of *C. mindorense* has been misidentified and distributed in some herbaria as *C. quadriloculare* (Blanco) Merr. On the other hand, the *Baker 941*, *Klemme, Herb. Philip. For. Bur. 5684*, and *Ramos 1336*, *Ramos & Edaño, Herb. Philip. Bur. Sci. 48506 & 48612*, distributed as *C. mindorense*, actually are *C. klemmei* Elm., while *Ramos & Edaño, Herb. Philip. Bur. Sci. 3384* is the type collection of *C. luzoniense* Merr. and *Bermejós, Herb. Philip. Bur. Sci. 318* is *C. minahassae* var. *brevitubulosum* H. J. Lam.

Citations: PHILIPPINE ISLANDS: Jolo: *Bartlett 16082* (Mi). Luzon: *Elmer 5964* (N), *15494* (Bz--20086, Ca--272336, N, Ut--67342, W--894528); *Group V & Gates s.n.* [Feb. 21, 1914] (Ka--60444); *Kienholz 59* [*Herb. Philip. Bur. Sci. 15209*] (Ca--263066); *Lichanco s.n.* [F. C. Gates 8477] (Mi); *Loher 6569* (Mu--4188); *R. C. McGregor, Herb. Philip. Bur. Sci. 12378* (Cm); *Moo s.n.* [Laguna, Jan. 12, 1914] (Mi); *Ramos & Edaño, Herb. Philip. Bur. Sci. 33627* (Bz--19738), *33784* (Bz--20089), *37579* (Bz--20085, W--1260319); *F. L. Stevens 1902* (Ur). Mindoro: *Bartlett 14642* (Mi), *13888* (Mi); *Kienholz 172* [*Herb. Philip. Bur. Sci. 15247*] (Ca--263034, N); *R. C. McGregor 210* (N, W--854978); *E. D. Merrill 1192* (Ld--photo of isotype, N--isotype, W--436165--isotype), *1234* (W--436204); *M. Ramos, Herb. Philip. Bur.*

Sci. 46418 (B, Bz--20084, Ca--308852, N). Negros: H. M. Curran, *Herb. Philip. For. Bur.* 17421 (W--709982). Palawan: Bermefos, *Herb. Philip. Bur. Sci.* 318 (N).

CLERODENDRUM MIRABILE J. G. Baker. *Journ. Linn. Soc. Lond.* 22: 513 [as "*Clerodendron*"]. 1887; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 53 & 90. 1942.

Synonymy: *Clerodendron mirabile* J. G. Baker, *Journ. Linn. Soc. Lond.* 22: 513. 1887.

Bibliography: J. G. Baker, *Journ. Linn. Soc. Lond. Bot.* 22: 513. 1887; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 1, 101 (1901) and imp. 2, 101. 1941; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 53 & 90 (1942) and ed. 2, 123 & 182. 1949; Mold. in Humbert, *Fl. Madag.* 174: 148, 165--167, 266, & 268, fig. 35 (3). 1956; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 3, 101. 1959; Mold., *Résumé* 155 & 451. 1959; Mold., *Fifth Summ.* 1: 260 (1971) and 2: 869. 1971; Mold., *Phytol. Mem.* 2: 249 & 540. 1980; P. Holmgren & al., *Ind. Vasc. Pl. Type Microf.* 441. 1985; Mold., *Phytologia* 58: 185 (1985) and 60: 275. 1986.

Illustrations: Mold. in Humbert, *Fl. Madag.* 174: 165, fig. 35 (3). 1956.

An erect shrub; stems slender, terete; branchlets slender, brownish and somewhat ridged in drying, more or less compressed at the nodes, glabrous; nodes annulate; principal internodes 1.5--5 cm. long; leaves mostly ternate, often appearing as though fasciculate, numerous; petioles very slender, 2--9 mm. long or mostly obsolete, canaliculate above, margined, glabrous; leafblades membranous or moderately firm-textured, green on both surfaces when fresh, brunnescient in drying, lighter beneath, elliptic or oblanceolate, 5--12 cm. long, 1--4.5 cm. wide, apically long-acuminate, marginally subentire or the larger ones usually rather irregularly serrate or sharply incised at or above the middle with acute or artrorsely apiculate rather distant teeth, basally long-attenuate into the petiole, glabrous or subglabrous on both surfaces, punctate beneath; midrib slender, flat above, prominulous beneath; secondaries very slender, very numerous, often rather indistinct, 10--20 per side, arcuate-ascending, flat above, very slightly subprominulous beneath, not plainly joined at the margins; veinlet reticulation rather abundant but usually rather obscure; inflorescence axillary and terminal, the axillary cymes mostly 1- or 2-flowered, the terminal panicle sparse, erect, composed of about 3 whorls of cymes, glabrous and brunnescient or nigrescent throughout; peduncles 2--3 cm. long; foliaceous bracts absent; bractlets lanceolate, about 1 cm. long, basally 1--1.5 cm. wide, apically long-attenuate to filiform, glabrous, a pair subtending each cyme-branch and one subtending each calyx, nigrescent; pedicels very short; calyx obconic, membranous, 2--2.5 cm. long, glabrous, nigrescent, the rim deeply 5-lobed, the lobes ovate-lanceolate, about half as long as the tube, 5--8 mm. long, apically long-attenuate; corolla hypocrateriform, the tube very slender throughout, to 17 cm. long and 3 mm. wide, glabrous, globosely inrolled before anthesis, the limb about 2 cm. wide, the

lobes broad, rounded; stamens curled up in bud so as to form a circle and a half; anthers oblong.

This endemic species is based on *Baron 4755* from central Madagascar, collected in or before 1855 and deposited in the Kew herbarium. Baker (1887) places it in the Subgenus *Cyclonema*, yet says that it is "Near *C. macrosiphon*, Hook. f." which is in Section *Siphonanthus* of typical *Clerodendrum*.

A key to help distinguish *C. mirabile* from other Madagascar taxa in this genus will be found under *C. baronianum* Oliv. in the present series of notes [58: 184--190].

Citations: MADAGASCAR: *Baron 4755* (E--photo of type, F--photo of type, K--type, Ld--photo of type, N--isotype, N--photo of type), 6889 (K).

CLERODENDRUM MOLLE H.B.K., Nov. Gen. Sp. Pl., ed. folio, 2: [198].

1817 [not *Clerodendrum molle* Jack, 1820].

Synonymy: *Clerodendrum molle* H. & B. apud Steud., Nom. Bot. Phan., ed. 1, 207. 1821. *Clerodendron molle* Bonpl. apud Spreng. in L., Syst. Veg., ed. 16, 2: 759. 1825. *Clerodendrum molle* W. J. apud W. Hook., Bot. Misc. 1: 283. 1829. *Clerodendron* sp. J. D. Hook., Trans. Linn. Soc. Lond. 20: 261. 1847. *Clerodendron molle* H.B.K. apud Schau. in A. DC., Prodr. 11: 659. 1847. *Volckameria mollis* Beurling ex Mold., Prelim. Alph. List Inv. Names 53 in syn. 1940. *Clerodendrum mollis* H.B.K. ex Mold., Alph. List Inv. Names 56 sphalm. 1942. *Clerodendrum molle* var. *molle* Mold. in Wiggins & Porter, Fl. Galáp. Isls. 484. 1971.

Bibliography: H.B.K., Nov. Gen. Sp. Pl., ed. folio, 2: [198] (1817) and ed. quarto, 2: [244]--245. 1818; Steud., Nom. Bot. Phan., ed. 1, 207. 1821; Kunth, Sp. Pl. 2: 39. 1823; Spreng. in L., Syst. Veg., ed. 16, 2: 759. 1825; W. Hook., Bot. Misc. 1: 283--284. 1829; Steud., Nom. Bot. Phan., ed. 2, 1: 383. 1840; D. Dietr., Syn. Pl. 3: 616. 1842; Walp., Repert. Bot. Syst. 4: 105. 1845; J. D. Hook., Trans. Linn. Soc. Lond. 20: 195 & 261. 1847; Schau. in A. DC., Prodr. 11: 659. 1847; N. J. Anderss., Vet. Akad. Handl. Stockh. 1853: 201. 1854; Buek, Gen. Spec. Syn. Candoll. 3: 106. 1858; N. J. Anderss., Galap. Veg. 82 & 201. 1859; Bocq., Adansonia, ser. 1 [Baill., Rec. Observ. Bot.], 3: 214. 1863; Rose, Contrib. U. S. Nat. Herb. 1: 136. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561. 1893; Robinson & Greenm., Amer. Journ. Sci. 150 [ser. 3, 50]: 147. 1895; Barnhart, Bull. Torrey Bot. Club 29: 590. 1902; B. L. Robinson, Proc. Amer. Acad. 38: 194--195. 1902; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 132. 1911; Knuth, Feddes Repert Spec. Nov. Beih. 43: [Init. Fl. Venez.] 607. 1927; Mold., Geogr. Distrib. Avicenn. 22 & 23. 1939; Mold., Prelim. Alph. List Inv. Names 21 & 53. 1940; Mold., Alph. List Inv. Names 19 & 56. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 33, 34, & 90. 1942; Jacks in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 561. 1946; Svenson, Amer. Journ. Bot. 33: 413 & 422. 1946; Mold., Alph. List Cit. 1: 4. 9, 30, 34, 50, 135, & 177 (1946), 2: 350, 351, 418, 428, 502, 544, 573, 580, & 640 (1948), 3: 696, 707, 765, 808, 849, 857, 870, 901, 917, 950, 968, 971, & 972 (1949), and 4: 982, 983, 1019, 1021, 1030, 1040,

1050, & 1223. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 40, 69, 70, 72, & 182. 1949; Mold., Phytologia 4: 45. 1952; Mold., Résumé 48, 79, 81, 82, 267, 392, & 451. 1959; Jacks., in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 561. 1960; Macbride, Field Mus. Publ. Bot. 13 (5): [Fl. Peruv.] 698 & 699. 1960; Bowman, Galap. 229 & 303. 1966; Schofield, Field Guide Galap. [5], pl. 1 & 14. 1970; Mold., Fifth Summ. 1: 90, 115, 135, 137, 138, 140, 451, & 464 (1971) and 2: 733 & 869. 1971; Mold. in Wiggins & Parter, Fl. Galap. Isls. 484--486, fig. 127 & pl. 84. 1971; Thornton, Darwin's Isl. 77 & 271. 1971; Wiggins & Porter, Fl. Galap. Isls. xx, 19, 21, & 982. 1971; Usinger, Mem. Pacif. Coast Entomol. Soc. 4: 276--277. 1972; López-Palacios, Revist. Fac. Farm. Univ. Andes 9 (13): 65--66. 1973; Mold. in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 139, 144, & 145. 1973; Balgooy, Pacif. Pl. Areas 3: 244. 1975; López-Palacios, Revist. Fac. Farm. Univ. Andes 17: 43. 1976; Soukup, Biota 11: 10. 1976; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 20. 1979; Mold., Phytol. Mem. 2: 83, 107, 127, 130, 132, 387, & 540. 1980; Raj, Rev. Palaeobot. Palyn. 39: 358 & 374. 1983; Schofield, Pl. Galap. Isls. 70. 1984; Mold., Phytologia 57: 404 & 458 (1985), 58: 181 (1985), and 62: 188. 1987.

Illustrations: Schofield, Field Guide Galap. pl. 14. 1970; Mold. in Wiggins & Porter, Fl. Galap. Isls. 285, fig. 127, & pl. 84 (in color). 1971; Schofield, Pl. Galap. Isls. 70. 1984.

A bush or shrub, 1--5 m. tall, or liana to 10 m. long; branches and branchlets slender, woody, gray or grayish to buff, conspicuously lenticellate, subterete, densely short-pubescent; nodes not annulate, prominently marked with the persistent petiole-bases; principal internodes 0.5--6 cm. long; leaves decussate-opposite or ternate; petioles slender, 3--8 mm. long, rather densely pubescent, the lowest 1--2 mm. persisting as a corky protuberance after the blade has fallen, not spine-tipped; leafblades thin-membranous or chartaceous, dark-green above when fresh but nigrescent in drying, lighter beneath, elliptic or ovate-elliptic, 1--6 cm. long, 0.5--3.4 cm. wide, apically acute or very short-acuminate to subobtuse, marginally entire, basally acute or subobtuse, finely and more or less sparsely pubescent above, densely short-tomentose beneath; midrib very slender, flat or subimpressed and usually more densely puberulent than the lamina above, very slightly prominent beneath; secondaries very slender, 3--6 per side, short, arcuately ascending, not at all or but slightly prominent beneath; vein and veinlet reticulation very delicate, obscure or indiscernible above, not at all prominent beneath; inflorescence axillary and terminal, the cymes ternate, solitary in each axil, divaricate, 3--7 cm. long, 1--4 cm. wide, loosely 7--9-flowered or sub-many-flowered, dichotomously brachiate, pubescent throughout; peduncles very slender, 1--3.7 cm. long, pubescent; bracts none; bractlets and prophylla linear or setaceous, about 1 mm. long, densely pubescent; pedicels very slender, 1--5 mm. long, densely pubescent; flowers delicately fragrant; calyx campanulate or cupuliform, green, not showy, pubescent, 5-lobed, the lobes ovate, apically acute, spreading; corolla hypocrateriform, white or pinkish, pubescent, the tube cylindric, slender, less than

2.5 cm. long, the limb 5-lobed, the lobes oblong; stamens 4, much exserted; filaments red-purple; fruiting-calyx cupuliform, little accrescent; fruit drupaceous, globose, fleshy, sulcate, separating into 4 corky pyrenes.

This species is based on *Bonpland* 3837 from Guayaquil, Ecuador, deposited in the Paris herbarium, photographed there by Macbride as his type photograph no. 39497.

The original Humboldt, Bonpland, and Kunth description of this species is variously cited as "1817" or "1818". The dates here used are those verified by the late Dr. John H. Barnhart (1902). The species obviously belongs in the *C. ligustrinum* - *C. margaritense* - *C. rusbyi* - *C. aculeatum* - *C. inerme* group. The *C. molle* of Jack, referred to in the synonymy (above), is a synonym of *C. villosum* Blume, which see.

Clerodendrum molle has been found growing by collectors in wet places, at the edges of marshes, on beaches, in forests, along roadsides, on rocky precipices along the seashore, in thickets in moist low ground, in open woodlands on hillsides, on coastal lava rocks, in rolling scrubland, at the borders of swamps, intermingled with *Macraea* shrubs, and in the partial shade of the transition zone between lowland and forest, as well as in the *Bursera graveolens* zone, from about sealevel to 330 m. altitude, in flower from October to April, as well as in June and July, and in fruit from January to April, as well as in October and November.

In the Galápagos Islands Svenson speaks of the species as "not uncommon" on Charles Island; Snodgrass & Heller call it "tolerably common" on Albemarle and "common on lava coast" on James; Eriksson found it "common in the forest areas" of James, while Wiggins & Porter describe it as "shrubs to lianas, common at 60 m. altitude and up to at least 1500 ft." on James; Itow calls it a "common shrub"; Taylor found it "in soil among lava blocks with dense undergrowth in the coastal belt", while Stewart avers that it is "occasional as bushes on lava beds near sea level and to 500 ft. altitude" -- on Charles Island he says it occurs commonly as bushes "near the shores, forming thickets".

Svenson describes the plant as growing in "gravelly soil, not uncommon. Shrub 5--15 ft. high. Flowers white, roseate in throat in places. At times somewhat climbing."

The corollas are described as having been "white" on *Asplund* 5877, *Dugand* 4833, *Wiggins* 18674, and *Wiggins & Porter* 269, "pink and white" on *Bowman* 45, "white with a deep-pink tube" on *Taylor* G.1, "limb white, tube light-purple" on *Howell* 8972, and "tube light-lilac, lobes white" on *Asplund* 15332.

Macbride (1960) describes the fruits as "baccate", but they are actually drupaceous.

Bowman (1966) reports that the moth, *Protoparce rustica galapagensis*, visits the flowers of *Clerodendrum molle* at dusk on Albemarle Island. *Thornton* (1971) and *Uisinger* (1972) report that a carpenter bee, *Xylocopa darwini*, cuts open the side of the corolla-tube and extracts the nectar, the tongue being too short to reach down the tube from its apex.

Hooker (1847) records this species from Charles Island on the basis of an unnumbered Darwin collection and from James Island on the basis of a Scouler collection. He comments that it is "Found also on the opposite coast of Columbia" [sic]. Andersson (1859) cites an unnumbered collection made by himself on Chatham, one by Darwin on Charles, and one by himself and one by Scouler on James Island. Robinson (1902) cites from Albemarle: Baur 168 and Snodgrass & Heller 59, 116, & 855; from Charles: Agassiz s.n., Andersson s.n., Darwin s.n., Lee s.n. and Snodgrass & Heller 443; from Chatham: Agassiz s.n., Andersson s.n., Baur 170, and Chierchia s.n.; from James: Andersson s.n., Scouler s.n., and Snodgrass & Heller 369; and from an undesignated island: Habel s.n. -- mostly deposited in the Gray Herbarium of Harvard University. He further asserts that the "*Clerodendron* sp." cited by Hooker (1847), Andersson (1854 & 1859), and Robinson (1902), based on Edmonston collections from Charles Island, is probably *C. molle*, and this has been verified by my examination of the Edmonston s.n. at Kew. It may be noted here that Andersson's Galap. Veg. is often cited as published in "1855" or "1857", but a paper published in 1859 is cited on page 80, so it could hardly have been published before that date!

Stewart (1911) cites his nos. 3275 & 3276 from Charles, 3277 & 3278 from Chatham, 3279 from Indefatigable, and unnumbered Andersson, Scouler, and Snodgrass & Heller collections from James Island and two unnumbered Edmonston collections from Charles Island, giving the species' "further distribution" as only Ecuador.

Knuth (1927) cites Miller & Johnston 8 and Johnston 82 from Margarita Island, but these collections actually represent *C. margaritense* Mold.

Svenson (1946) cites only his nos. 156 & 11173 and comments that "The pinkish flowers in terminal cymes are followed by corky capsules which are well adapted for floating. The material agrees with the original description of specimens coming from Guayaquil except that the upper leaf surface is a little pubescent. It has a densely pubescent under-surface of the leaf and is the same as plants which I collected on Charles Island in the Galapagos."

Schofield (1984) says of this species in the Galapagos Islands: "Often in forests at middle elevations on the major islands, usually seen on trail to Salt lake on Santiago, near Academy Bay and Tortoise Reserve (Santa Cruz), and at Tagus Cove (Isabela); also distributed from Central to South America."

Material of *Clerodendrum molle* has been misidentified and distributed in some herbaria as *C. ternifolium* H.B.K., *Volkameria inermis* L., and even *Aegiphila* sp. On the other hand, the Fosberg 44880, Howell 9090, and Wiggins 18329, distributed as *C. molle*, actually represent its var. *glabrescens* Svenson, which see.

Citations: PANAMA: Panamá: Née 3 (Q). COLOMBIA: Antioquia: Dugand 4833 (W--2174952). ECUADOR: Guayas: Asplund 5048 (S, W--1930373), 5877 (Gg--354940, N, S, W--1930638), 15332 (N, S); Bonpland 3837 [prope Guayaquil; Macbride photos 39497] (B--isotype, F--1038376--photo of type, Kr--photo of type, Ld--photo of type, N--photo of type, P--type, P--isotype, S--photo of type, W--photo of type); Cu-

ming 32 (K); Fagerling & Wibom 366a (S), 366b (S), 448 (S); A. S. Hitchcock 20014 (G, N, W--1195080), 20081 (G, N, W--1195134); Jameson s.n. [Guayaquil] (K, Pd); Remy s.n. [Bords de la rivier de Guayaquil, Nov. 1856] (P); Svenson 11173 (Ca--771410, N, W--1832524, W--1832580); Tafalla s.n. [Guayaquil] (B). Manabi: Barclay 695 (Bm). ECUADORIAN OFFSHORE ISLANDS: Puna: Barclay 441 (Bm, N), 2433 (Bm). GALAPAGOS ISLANDS: Floreana: Rorud 208 (Ol). Isabela: Bauer 168 (G); Howell 8972 (Gg--462970, W--2814451); Snodgrass & Heller 59 (G), 116 (Du--9527, G), 855 (G); A. Stewart 3275 (Gg--32027), (Bi, G, Gg--32026, W--921582). Marchena: Steindachner 47 (V). San Cristóbal: N. J. Andersson 119 (B, Cp, K, Lu, P, Us, V), s.n. [Chatham] (Cb, G, Le, X); Bauer 170 (G); Howell 8603 (Gg--463074); A. Stewart 3277 (G), 3278 (G, Gg--32029, W--921583); Wiggins & Porter 392 (Ac). Santa Cruz: N. J. Andersson s.n. [Indefatigable] (S); s.n. [1852] (E--118869); Bowman 45 (Ca--13533, Gg--451123); Fournier 77 (Ld); Hendrickson H-39 (Ld); Otow 51 (Du--564527), 54 (Du--564526); G. A. Smith s.n. [Feb. 1964] (Gg--454734--photo); R. G. Taylor G.1 (Gg--461220); Wiggins 18674 (Ld, W--2818214). Santa Maria: Agassiz s.n. [Charles, Mar. 30, 1891] (G, W--57694), s.n. [Charles, April 1, 1891] (W--57695); N. J. Andersson s.n. [Charles] (B, Br, N, S, V), s.n. [Chatham & Charles] (S); Edmonston s.n. [Charles Isl.] (K); Howell 8862 (Gg--462968); Itow 175 (Du--564534), 193 (Du--564529); Lee s.n. [Charles Island, April 8, 1888] (W--25583, W--25606); Markham s.n. [Charles Isl.] (K); Penny s.n. [Riley 429] (Bm, K); Snodgrass & Heller 443 (G, W--543119); A. Stewart 3277 (Gg--32030), 3278 (Bi); Svenson 156 (F--670330, G, J). Santiago: Ericksen s.n. [8/9/1947] (Go); Howell 9703 (Gg--463075, N); Reeder s.n. [Sept. 10, 13, 1975] (Ws); Scouler s.n. [James Isl.] (K); Snodgrass & Heller 369 (Du--9528, G); D. Snow 124 (Du--564538); Wiggins & Porter 269 (Ld). PERU: Department undetermined: Née 15 (Q). MOUNTED ILLUSTRATIONS: Schofield, Pl. Galap. Isls. 70. 1984 (Ld).

CLERODENDRUM MOLLE var. *GLABRESCENS* Svenson, Amer. Journ. Bot. 22: 251 [as "*Clerodendron*"]. 1935; Mold., Geogr. Distrib. Avicenn. 23. 1939.

Synonymy: *Clerodendron molle* var. *glabrescens* Svenson, Amer. Journ. Bot. 22: 251. 1935. *Clerodendron molle* var. *glabra* Svenson ex Mold., Prelim. Alph. List Inv. Names 21 in syn. 1940.

Bibliography: Svenson, Amer. Journ. Bot. 22: 251. 1935; Mold., Geogr. Distrib. Avicenn. 23. 1939; Mold., Prelim. Alph. List Inv. Names 21. 1940; Mold., Alph. List Inv. Names 19. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 34 & 90. 1942; Svenson, Amer. Journ. Bot. 33: 480. 1946; Mold., Alph. List Cit. 2: 350, 428, & 502 (1948), 3: 901 & 972 (1949), and 4: 982. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 70 & 182. 1949; Mold., Résumé 81, 267, & 451. 1959; Mold., Fifth Summ. 1: 138 & 451 (1971) and 2: 869. 1971; Mold. in Wiggins & Porter, Fl. Galáp. Isls. 484 & 486. 1971; Wiggins & Porter, Fl. Galáp. Isls. 982. 1971; Balgooy, Pacif. Pl. Areas 3: 244. 1975; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 20. 1979; Mold., Phytol. Mem. 2: 130 & 540. 1980.

This variety differs from the typical form of the species in its

leafblades being merely puberulent or glabrate above and merely very lightly and obscurely pulverulent-puberulent and punctate or even subglabrous beneath.

The variety is based on *H. K. Svenson 11* from along a trail at Academy Bay, on what used to be called Indefatigable Island, in the Galapagos Islands, collected on April 3, 1930, and deposited in the Brooklyn Botanic Garden herbarium. The collector describes the plant as a shrub, 3--6 feet tall, with white corollas whose tubes are roseate and chocolate-brown anthers. He describes the leaves and sepals as glabrous. In his 1946 work he states: "Specimens identical with var. *glabrescens* Svenson....were collected on Indefatigable Island by Schimpff (no. 70) and named *C. ternifolium* HBK at Berlin. These glabrous and pubescent plants are evidently trivial forms of the same species. They have aculeate petiole bases and are not far removed from the West Indian *C. aculeata*." He speaks of the fruits as "capsules", but, of course, they are drupes.

Collectors have encountered this plant at altitudes of 100--200 m., in flower in January, April, and May, and in fruit in July. Fosberg refers to it as "occasional in roadside thickets" or "local in open scrub forest and basaltic lava rock"; Stewart describes it as "occasional bushes in woodland on the lower portions of the island".

Collectors describe the plant as a very floriferous, intricately branched, straggly bush or shrub, 0.5--2 m. tall, with a "slightly skunky odor when broken", the leafblades punctate beneath, and the corollas as salverform. The corollas are said to have been "white" on Fosberg 44880, "the tube rose-purple, limb white" on López-Palacios 4291, "tube lavender, lobes white" on Howell 9090 and Wiggins 18329, and "tube pinkish, limb white" on Fosberg 44870.

A vernacular name reported for the plant is said to be "rodilla de pollo".

Material has been misidentified and distributed in some herbaria as *C. ternifolium* H.B.K. and as *Malpighia* sp.

Citations: GALAPAGOS ISLANDS: Santa Cruz: Fosberg 44689 (W--2879604), 44870 (Ld), 44880 (Ac, W--2814900); Howell 9090 (Gg--462971); López-Palacios 4291 (Ld); Reeder s.n. [March 22, 1975] (Ws); Schimpff 70 (B, Bm, Cb, E--1972289, Gg--212506, Mu, N, P, S, Ut); A. Stewart 3279 (Gg--32028); Svenson 11 (Bi--isotype, Ca--474429--isotype, F--670331--isotype, G--isotype, J--type, Ld--photo of type, N--photo of type), 136 (B, Bi, Ca--474428, F--670324, J, K, N, S); Wiggins 18329 (Ld, W--2818267).

CLERODENDRUM MONTANUM Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 100--101. 1936.

Bibliography: B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 38, 67, 94, & 100--101. 1936; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 49 & 90. 1942; Hill & Salisb., Ind. Kew. Suppl. 10: 55. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 116 & 182. 1949; Mold., Résumé 144 & 451, 1959; Mold., Fifth Summ. 1: 236 (1971) and 2: 869. 1971; Mold., Phytol. Mem. 2: 225 & 540. 1980; P. Holmgren & al., Ind. Vasc. Pl. Type Microf. 441. 1985.

A low shrub, to 2 m. tall, conspicuously branched; branchlets

squarrose, sometimes tetragonal, often striate, dark-flavescent hirtous or almost glabrous; leaves decussate-opposite; petioles 5--15 mm. long, hispidulous; leafblades coriaceous, obovate-rotund, 4--8 cm. long, 2--5 cm. wide, apically short-acuminate, marginally entire, basally rounded, hirtous above, pubescent beneath or only on the venation beneath; flowers aggregate in small foliose heads; peduncles and pedicels 1--4 mm. long, hispidulous; bracts foliose, ovate-oblong or lanceolate, 0.5--2 cm. long, 2--6 mm. wide, apically acute, hispidulous; calyx violet, basally cupular-campanulate and about 3 mm. long and 2 mm. wide, apically expanded into a widely spreading limb about 1 cm. long and divided to beyond the middle into 5 triangular or subovate-triangular teeth, hispidulous, ciliate, basally 4 mm. wide, not prominently venose; corolla white, fragrant, the tube violaceous, curvate, about 3.2 cm. long, glandular-pilose, basally and apically ampliate, the limb 5-lobed, the lobes subequal, about 7 mm. long, ovate-oblong, reclinate; stamens long-exserted, didynamous, inserted near the apex of the corollatube; filaments about 5 cm. long; anthers 2 mm. long; style 5.5 cm. long, surpassing the stamens; stigma shortly bifid; ovary about 2 mm. long, dark, glabrous; mature fruit unknown.

This species is based on *Goetze 770* from 1750 m. altitude at Makatan, Uben, Tanganyika (Tanzania), collected on March 21, 1899, and deposited in the Berlin herbarium, now destroyed. Collectors have encountered the plant at 1600--2000 m. altitudes. Thomas (1936) cites also *Stolz 2713* and *Troll 5514* from Tanganyika. The species is a member of Subsection *Capitata*, of Section *Macrocalyx*, Subgenus *Euclerodendrum*, and appears to be endemic to Tanganyika.

Citations: TANZANIA: Tanganyika: *Goetze 770* (Br--isotype, Ld--photo of isotype, N--isotype, N--photo of isotype).

CLERODENDRUM MORAMANGENSE Mold., *Lloydia* 13: 210--211. 1950.

Bibliography: Mold., *Lloydia* 13: 210--211. 1950; E. J. Salisb., *Ind. Kew. Suppl.* 11: 56. 1953; Mold. in Humbert, *Fl. Madag.* 174: 153, 217, 219--220, & 268, fig. 35 (3). 1956; Mold., *Résumé* 155 & 451. 1959; Mold., *Fifth Summ.* 1: 260 (1971) and 2: 869. 1971; Mold., *Phytol. Mem.* 2: 249 & 540. 1980; P. Holmgren & al., *Ind. Vasc. Pl. Microf.* 441. 1985; Mold., *Phytologia* 58: 188. 1985.

Illustrations: Mold. in Humbert, *Fl. Madag.* 174: 217, fig. 35 (3). 1956.

A shrub; branches medium-slender, very light-gray, subterete, lenticellate, glabrate; branchlets slender, almost white, obtusely tetragonal, often sulcate, prominently lenticellate, glabrous throughout; nodes not annulate; principal internodes 1.5--5.3 cm. long; leaf-scars large, divergently prominent, corky; leaves decussate-opposite; petioles stoutish, 2--8 mm. long, subglabrous; leafblades coriaceous, elliptic-oblancheolate, 2.8--9 cm. long, 1.4--1.9 cm. wide, often slightly falcate, apically mostly short-acuminate or rarely emarginate, marginally entire, basally acute, glabrous and shiny on both surfaces, rather inconspicuously impressed-punctate beneath; midrib slender, impressed above, sharply prominent beneath; secondaries slender, 5--7 per side, often more or less impressed a-

bove, sharply prominent beneath, ascending but often arcuate only toward the margins, anastomosing in loops near the margins beneath; veinlet reticulation indiscernible above, the larger parts prominent beneath; inflorescence terminal, cymose, 1--7-flowered; peduncles extremely abbreviated or obsolete; pedicels rather stout, 5--8 mm. long, glabrous; calyx herbaceous, 2.3--2.7 cm. long, 9--12 mm. wide, not nigrescent nor brunnescent in drying, oblong-cylindric, glabrous, the rim deeply 5-lobed, the lobes triangular-ovate, 6--10 mm. long, apically attenuate-acute, erect; corolla infundibular, vivid rose-color when fresh, its tube infundibular, broadly cylindric, 3--4 cm. long, about twice as long as the calyx, apically greatly ampliate, externally microscopically pulverulent-puberulent or glabrate, the lobes broadly elliptic, about 1.5 cm. long, apically rounded; stamens about equaling the corolla-limb; pistil slightly exserted; fruiting-calyx and fruit not known.

This endemic Madagascar species is based on *Decary 18257* from Lakato, Moromanga District, Madagascar, collected on September 5, 1942, and deposited in the Paris herbarium. Thus far it is known to me only from the original collection.

A key to help distinguish this species from other Madagascar taxa in this genus will be found under *C. baronianum* Oliv. in the present series of notes [58: 184--190].

Citations: MADAGASCAR: *Decary 18257* (E--photo of type, F--photo of type, Ld--photo of type, N--fragment & photo of type, P--type).

CLERODENDRUM MORIGONO Chiov., Racc. Bot. Miss. Consol. Kenya 98 [as "*Clerodendron*"]. 1935; Mold., Known Geogr. Distrib. Verbenac., ed 1, 50 & 90. 1942.

Synonymy: *Clerodendron morigono* Chiov., Racc. Bot. Miss. Consol. Kenya 98. 1935.

Bibliography: Chiov., Racc. Bot. Miss. Consol. Kenya 98. 1935; Hill, Ind. Kew. Suppl. 9: 68. 1938; Mold., Known, Geogr. Distrib. Verbenac., ed. 1, 50 & 90 (1942) and ed. 2, 117 & 182. 1949; Mold., Résumé 146 & 451. 1959; Mold., Fifth Summ. 1: 240 (1971) and 2: 869. 1971; Mold., Phytol. Mem. 2: 230 & 540. 1980.

Nothing is known to me of this taxon except that it is supposed to be a native of Kenya.

CLERODENDRUM MOSSAMBICENSE Klotzsch in Peters, Naturwiss. Reise Mossamb. 6 Bot. 1: 259 [as "*Clerodendron*"]. 1861; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 37, 63, & 94. 1936.

Synonymy: *Clerodendron mossambicense* Klotzsch in Peters, Naturwiss. Reise Mossamb. 6 Bot. 1: 259. 1861. *Clerodendron stenanthum* Klotzsch in Peters, Naturwiss. Reise Mossamb. 6 Bot. 1: 258--259. 1861. *Clerodendrum stenanthum* Klotzsch apud B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 63 in syn. 1936.

Bibliography: Klotzsch in Peters, Naturwiss. Reise Mossamb. 6 Bot. 1: 258--259. 1861; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561. 1893; Gürke in Engl., Pflanzenw. Ost-Afr. C: 340. 1895; K. Schum., Justs Bot. Jahresber. 28 (1): 496. 1900; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 86, 110, & ix.

1921; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 37, 63, & 94. 1936; Mold., Alph. List Inv. Names 20. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 49, 51, & 90. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 561. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 116, 120, & 182. 1949; Mold., Résumé 144, 150, 270, & 451. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 561. 1960; Mold., Résumé Suppl. 9: 3 (1964) and 15: 8. 1967; Mold., Fifth Summ. 1: 236, 251, 451, & 456 (1971) and 2: 869. 1971; Mold., Phytol. Mem. 2: 225, 240, & 540. 1980; P. Holmgren & al., Ind. Vasc. Pl. Type Microf. 441. 1985; Mold., Phytologia 58: 303 & 422 (1985), 59: 415 (1986), and 61: 281. 1986.

Collectors describe what I take to be material of this species as a shrub, 1--2 m. tall, many-stemmed, with white corollas, growing in "solos argilo-coraligeros pardos", at 10 m. altitude, flowering in March, with the vernacular names "namunepa" and "ndumbi".

Thomas (1936) describes the species in his key as "Blütenstand einseitswendig, kopfig, endständig am Zweigende; Brakteen elliptisch-lanzettlich; Blätter bis 12 cm lang; keine Dornen; niedrige Sträucher". He also states that the petioles are over 1 cm. long, the leafblades, petioles, branches, and corolla-tubes glabrous or subglabrous. According to a letter received from Sir George Taylor, dated June 13, 1966, the *Lamos & Macudcua* 50, *Mendonça* 1242, and *Torre & Paiva* 12101 which I sent to Kew for examination were duly examined there "but in the absence both of material of this species and specimens to match [the] Torre & Paiva [material] no identification was possible". The collections cited below are placed here tentatively -- the *Lamos & Macudcua* 50 was originally distributed as "aff. *C. buchneri* Gürke".

Gürke (1895) asserts that *C. mossambicense* is related to *C. fischeri* var. *robustum* (Klotzsch) Thomas; Bakhuizen (1921) reduces it to synonymy under *C. capitatum* (Willd.) Schum. & Thonn., as does Schumann (1900). The Schumann reference is sometimes cited as "1902" which is the titlepage date.

Thomas (1936) cites the type, *Peters s.n.*, collected in 1843, and another Peters collection from Rios de Sena, Mozambique, as well as, from Tanganyika, *Busse* 2491 & 2901 and *Schlieben* 6515.

Citations: MOZAMBIQUE: Cabo Delgado: *Torre & Paiva* 12101 (Ld, U1). Mozambique: *Lamos & Macudcua* 50 (U1).

CLERODENDRUM MOSSAMBICENSE var. *GLABRUM* Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 63. 1936.

Bibliography: B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 63. 1936; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 49 & 90 (1942) and ed. 2, 116 & 180. 1949; Mold., Résumé 144 & 451. 1959; Mold., Fifth Summ. 1: 236 (1971) and 2: 869. 1971; Mold., Phytol. Mem. 2: 225 & 540. 1980; P. Holmgren & al., Ind. Vasc. Pl. Type Microf. 441. 1985.

This variety differs from the typical form of the species in having the calyx-lobes glabrous and not ciliate-margined.

The variety is based on *Busse* 2335 from Lindi, Tanganyika (Tanzania), collected on April 30, 1903, and deposited in the Berlin

herbarium, now destroyed. It is known to me thus far only from the original collection.

Citations: TANZANIA: Tanganyika: *Busse* 2335 (Br--isotype, Ld--photo of isotype, N--fragment & photo of isotype).

CLERODENDRUM MULTIBRACTEATUM Merr., *Philip. Journ. Sci. Bot.* 7: 98--99 [as "*Clerodendron*"]. 1912; Mold., *Alph. List Comm. Vern. Names* 24. 1939.

Synonymy: *Clerodendron multibracteatum* Merr., *Philip. Journ. Sci. Bot.* 7: 98. 1912.

Bibliography: E. D. Merr., *Philip. Journ. Sci. Bot.* 7: 98--99. 1912; H. J. Lam, *Verbenac. Malay. Arch.* 270 & 364. 1919; Bakh. in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 95. 1921; Prain. *Ind. Kew. Suppl.* 5, imp. 1, 62. 1921; E. D. Merr., *Enum. Philip. Flow. Pl.* 3: 404. 1923; Mold., *Alph. List Comm. Vern. Names* 24. 1939; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 62 & 90. 1942; Mold., *Phytologia* 2: 100. 1945; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 141 & 182. 1949; Mold., *Résumé* 183 & 451. 1959; Prain, *Ind. Kew. Suppl.* 5, imp. 2, 62. 1960; Mold., *Fifth Summ.* 1: 316 (1971) and 2: 869. 1971; Mold., *Phytol. Mem.* 2: 307 & 540. 1980; Mold., *Phytologia* 62: 139. 1987.

A shrub or tree, 4--9 m. tall; branches terete, brownish, lenticellate; branchlets rather densely pubescent with short appressed hairs; leaves decussate-opposite; petioles 1.5--2.5 cm. long, pubescent; leafblades subcoriaceous, oblong to oblong-ovate, 8--13 cm. long, 4--5.5 cm. wide, apically acuminate (the acumen itself often rather slender and blunt), marginally entire or rarely with a few, scattered, irregular teeth, basally acute or somewhat rounded, glabrous above except for the somewhat pubescent larger venation, pubescent on the larger venation also beneath and with numerous, minute, shining glands; secondaries 6--8 per side, prominent; veinlet reticulation rather loose; inflorescence terminal, paniculate, 10--15 cm. long, the ramifications somewhat spreading, pubescent, naked below, each subtended by large bracts, the flowers crowded at the apices of the ramifications and surrounded by numerous bracts and bractlets; lower bracts 2.5 cm. long, upper ones and bractlets thin, narrowly ovate or ovate, 1--1.5 cm. long, apically acuminate, basally narrowed, sparingly pubescent and glandular, white during anthesis, persistent and pink or purplish in fruit; calyx somewhat longitudinally plicate, the lobes broadly ovate, 5--6 mm. long, apically acuminate; corolla hypocrateriform, white, the tube cylindric, about 5 mm. long, 2 mm. wide, nearly glabrous, the lobes narrowly elliptic-ovate, 5--6 mm. long, 2.5 mm. wide, recurved, apically obtuse or acute, slightly pubescent; filaments long-exserted, recurved; anthers 1.5 mm. long; style 1.5 cm. long; fruiting-calyx loosely enclosing the fruit, pink or purplish; fruit drupaceous, globose, about 6 mm. long and wide.

This species is based on *Vanoverbergh* 777 from forests, at 1550 m. altitude, at Malamey, Bontoc Subprovince, Luzon, Philippine Islands, collected in flower on August 28, 1910. Merrill (1912) cites also *Klemme*, *Herb. Philip. For. Bur.* 5713 from Luzon and *Merrill*

5516 from Mindoro. He notes that this is "A species probably as near *Clerodendron macrostegium* Schau. as to any other species, but entirely different from that form, and not closely allied to it. It is well characterized by its rather large, numerous, crowded, white or colored bracts and bracteoles which persist until after the fruit is matured, its oblong leaves, and its short flowers". In his 1923 work he describes it as endemic "in the mossy forests, altitude 1,600 to 2,000 m." A vernacular name reported for it is "palutan".

Collectors have found the plant in flower from August to December and in fruit in November and December.

Material of *C. multibracteatum* has been misidentified and distributed in some herbaria as *C. infortunatum* L. On the other hand, the *Loher 13371*, distributed as *C. multibracteatum*, actually is *C. macrostegium* Schau., while *Ramos & Edaño*, *Herb. Philip. Bur. Sci. 48479* is *C. philippinense* Elm.

Citations: PHILIPPINE ISLANDS: Luzon: *Klemme*, *Herb. Philip. For. Bur. 5713* (N, W--2376366); *Loher 12423* (Mu--4373); *Ramos & Edaño*, *Herb. Philip. Bur. Sci. 37836* (Bz--19705); *Vanoverbergh 777* (Ld--photo of type, Vi--isotype, W--900053--isotype), 2369 (Ws). Mindoro: *E. D. Merrill 5516* (N, W--710765).

CLERODENDRUM MÜNZNERI Thomas, *Engl. Bot. Jahrb.* 68: [Gatt. *Clerod.*] 105. 1936.

Synonymy: *Clerodendrum muenzneri* Thomas apud Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 49 & 90. 1942. *Clerodendron muenzneri* Berthold Thomas apud Hill & Salisb., *Ind. Kew. Suppl.* 10: 55. 1947.

Bibliography: B. Thomas, *Engl. Bot. Jahrb.* 68: [Gatt. *Clerod.*] 46, 83, 94, & 105. 1936; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 49 & 90. 1942; Hill & Salisb., *Ind. Kew. Suppl.* 10: 55. 1947; Mold., *Alph. List Inv. Names Suppl.* 1: 7. 1947; H. N. & A. L. Mold., *Pl. Life* 2: 73. 1948; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 116 & 182. 1949; Mold., *Résumé* 144, 273, & 451. 1959; Mold., *Fifth Summ.* 1: 236 & 464 (1971) and 2: 869. 1971; Mold., *Phytol. Mem.* 2: 225 & 540. 1980.

A shrub, about 1.5 m. tall; flowering branches obtusely angular, sulcate, rather densely short-puberulent; principal internodes rather elongate; leaves ternate; petioles short but distinct, 1--2 cm. long; leafblades membranous, fragile in drying, ovate or broadly ovate, 12--16 cm. long, 8--11 cm. wide, apically "breviter longe lateque cuneatim angustata", marginally entire on the lower portion but coarsely and irregularly crenate on the upper portion with minutely apiculate teeth, short-pilose above with hairs situated on small tubercles, very shortly villous-puberulent beneath; venation prominulent on both surfaces; inflorescence paniculate, the panicles elongate, foliose, with elongated sympodia, the leaves gradually diminishing in size upwards, the uppermost bract-like, the axillary cymes ternate, the lower ones 10--11 cm. long, long-pedunculate, loose; bracts and bractlets small, subulate, villous-puberulent; calyx conic-campanulate, about 9 mm. long, villous, 5-lobed to about 1/3 its length, the lobes rounded or semi-elliptic, erect to spreading, not reflexed, basally 3--4 mm. wide, with sessile glands

on the inner surface; corolla blue, distinctly zygomorphic, the tube 9 mm. long, curvate, constricted at the mouth, the posterior side split to the middle, the lobes narrowly obovate, somewhat ciliate, "4--6 fere aequalibus" and about 8 mm. long, the fifth larger, concave, and about 12 mm. long; stamens inserted at about $\frac{2}{3}$ the length of the tube, long-exserted; filaments subequal, about 4 cm. long, basally villous; anthers 1 mm. long; style long-exserted; stigma bifid, the branches 2 mm. long; ovary glabrous ("intus glabrum"); mature fruit not known.

This species, a member of the Subgenus *Cyclonema*, is based on *Fromm & Münzner 108* from woody veld on limestone substrate, at 1800 m. altitude, at Msamvia, southern Ufipa, Tanganyika, collected on January 8, 1909, and deposited in the Berlin herbarium, now destroyed. The species is known thus far to me only from the type collection and nothing is known to me of it beyond what is stated in the brief bibliography (above). A key to help distinguish it from the other African taxa of *Cyclonema* as accepted by Thomas (1936) will be found under *C. myricoides* (Hochst.) R. Br. in the present series of notes.

CLERODENDRUM MULTIFLORUM (Burm. f.) Kuntze, Rev. Gen. Pl. 2: 506 [as "*Clerodendron*"]. 1891.

Synonymy: *Volkameria multiflora* N. L. Burm., Fl. Indica 137, pl. 45-1. 1768.

This binomial is used for what we call *C. phlomidis* L. f. by Bakhuizen in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 75, 84, 110, & ix. 1921; Rau, Bull. Bot. Surv. India 10 Suppl. 2: 62. 1969; M. L. & M. M. Dhar & al., Indian Journ. Exp. Biol. 9: 94. 1971; etc., but is invalidated by the *Clerodendrum multiflorum* of G. Don [Edinb. New Philos. Journ. 11: 350. 1824] -- see under *C. phlomidis* L. f. in the present series of notes.

A letter received by me from Mrs. L. Pinner, Compiler of the Index Kewensis, dated November 7, 1972, says, in part: "It would appear that the Kuntze name is a later homonym as I see nothing wrong with the [validity of] the description of *C. multiflorum* G. Don".

CLERODENDRUM MYRIANTHUM Mildbr., Notizbl. Bot. Gart. Berlin 11: 677-678 [as "*Clerodendron*"]. 1932; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 41, 73, & 94. 1936.

Synonymy: *Clerodendron myrianthum* Mildbr., Notizbl. Bot. Gart. Berlin 11: 677. 1932.

Bibliographv: Mildbr., Notizbl. Bot. Gart. Berlin 11: 677--678. 1932; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 8, 11, 16, 41, 73, & 94. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 68. 1938; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 571. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 49 & 90 (1942) and ed. 2, 116 & 182. 1949; Mold., Résumé 144 & 451. 1959; Mold., Fifth Summ. 1: 236 (1971) and 2: 869. 1971; Mold., Phytol. Mem. 2: 225, 387, & 540. 1980; P. Holmgren & al., Ind. Vasc. Pl. Type Microf. 441. 1985.

A woody shrub or liana, often high-climbing and at least to 15 m. long; older flowering branches glabrous, about 5 mm. thick, dark-violet, with pale elongated lenticels; leaves decussate-opposite;

petioles 3--5 cm. long, glabrous, geniculate, basally incrassate, the basal portion long-persistent and spinescent after the blade has been shed; leafblades oval or narrowly ovate, 15--23 cm. long, 8--13 cm. wide, apically rather long-acuminate to almost caudate-acuminate, marginally obsoletely undulate, basally rounded, dark olivaceous above in drying, impressed-punctate (under a handlens) beneath; midrib impressed above, very prominent beneath; secondaries 6 per side, arcuate-ascending, arcuately joined near the margins, impressed above, very prominent beneath; inflorescence paniculate, the panicles large, pyramidal or ovoid in outline, rarely subcorymbose, arising from the axils of the leaves at the base of the branches or sometimes above the axils, very dense, to 24 cm. long and 12 cm. wide; flowers comparatively small, fetid; calyx campanulate-rotate, about 5 mm. long in all, the lobes recurved-spreading, about 2.5 mm. long, apically gradually acuminate; corolla white, hypocrateriform, glabrous, the tube scarcely 1 cm. long, slightly narrowed toward the mouth, the lobes obovate-oval, about 3 mm. long; stamens very long-exserted; filaments about 2.5 cm. long, glabrous; style filiform, about 3 cm. long, glabrous; ovary depressed-globose, glabrous, 4-sulcate.

This apparently endemic species is based on *H. J. Schlieben 2143* from a creek valley with boulders and groups of trees, at 900 m. altitude, at Liondo, not far from the Mahenge station, Mahenge, Tanganyika (Tanzania), collected in flower on April 30, 1932, and deposited in the Berlin herbarium, now unfortunately destroyed. Mildbraed (1932) comments that "Die Angabe des Sammlers über den Wuchs ist etwas zweifelhaft. Ich nehme an, dass es sich um eine Liane handelt, die sich über eine Baumkrone ausbreitet. Die Beschaffenheit der Blattstiele spricht für einen Klimmstrauch. Die neue Art hat kleine Blüten in sehr grossen dichten Rispen. Sie dürfte *C. toxicarium* Bak. am nächsten kommen, unterscheidet sich von diesem aber schon durch die unterseits kahlen Blätter."

It should be pointed out here that Thomas (1936) erroneously writes the original publication citation of *C. myrianthum* as "Notizbl. Bot. Gart. Berlin 107 (1932)" -- the "107" is merely the issue number, not either a volume or page number. He cites only the original collection.

Collectors have found this plant growing at 800--1000 m. altitude, in flower in April. Material has been misidentified and distributed in some herbaria as *C. glabratum* Gürke and *C. scheffleri* Gürke.

Citations: TANZANIA: Tanganyika: *Peter 311* [O.I.10.B] (B, B); *Schlieben 2143* (B--type, B--isotype, Br--isotype, Ld--photo of isotype, Mu--isotype, N--fragment & photo of isotype).

CLERODENDRUM MYRICOIDES (Hochst.) R. Br. in Salt, Voy. Abyss. app. 1xv nom nud. [as "*Clerodendron*"]. 1814; Steud., Nom. Bot. Phan., ed. 2, 1: 383. 1840; Schau. in A. DC., Prodr. 11: 675. 1847 [not *C. myricoides* Auct., 1962].

Synonymy: *Clerodendrum myricoides* "R. Br. in Salt." ex Steud., Nom. Bot. Phan., ed. 2, 1: 383. 1840. *Spironema myricoides* Hochst.,

Flora [Bot. Zeit. Regensb.] 25: 226 in syn. 1842. *Cyclonema myricoides* Hochst., Flora [Bot. Zeit. Regensb.] 25: 226. 1842. *Cyclonema serratum* Hochst., Flora [Bot. Zeit. Regensb.] 25: 227. 1842. *Cyclonema sylvaticum* Hochst., Fl. Ratisb. 1: 225. 1842. *Cyrtostemma myricoides* Kunze, Bot. Zeit. 1: 272. 1843. *Cyclonema myricoides* φ *sylvaticum* Schau. in A. DC., Prodr. 11: 676. 1847. *Clerodendron myricoides* R. Br. apud A. Rich., Tent. Fl. Abyss. 2: 171 in syn. 1851. *Cyclonema myricoides* var. *glabrata* Schweinf. ex Oliv., Trans. Linn. Soc. Lond. 29: 133. 1875. *Cyclonema myricoides* Hook apud Edgeworth, Pollen, ed. 1, 76. 1877. *Clerodendron myricoides* (Hochst.) Vatke, Linnaea 45: 535, 1882. *Clerodendron myricoides* var. *glabra* Schweinf. ex Engl., Hochgebirgsfl. Trop. Afr. 356. 1892. *Clerodendron myricoides* (Hochst.) Gürke ex Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 176. 1895. *Siphonanthus myricoides* (Hochst.) Hiern, Cat. Afr. Pl. Welw. 4: 844. 1900. *Cyclonema myricoides* var. *sylvaticum* Schau, apud H. H. W. Pearson in Thiselt.-Dyer, Fl. Cap. 5: 223 in syn. 1901. *Clerodendron myricoides* Gürke apud Durand & Jacks., Ind. Kew. Suppl. 1, 101 in syn. 1901. *Cyclonema myricoides* (Hochst.) Schau. apud Almagia in Pirotta, Fl. Colon. Erit. [Ann. Ist. Bot. Roma 8:] 134. 1903. *Siphonanthus myricoides* Hiern apud Thiselt.-Dyer, Ind. Kew. Suppl. 2: 172. 1904. *Clerodendron myricoides* α *typicum* Fiori, Buschi Pianta Legn. Eritrea [Bibl. Agr. Colon. 7:] 324. 1912. *Clerodendron myricoides* γ *sylvaticum* Hochst. ex Fiori, Buschi Pianta Legn. Eritrea [Bibl. Agr. Colon. 7:] 324. 1912. *Clerodendron nigricoides* Hochst. ex Irvine, Pl. Gold Coast 109 sphalm. 1930. *Clerodendron myricoides* var. *sylvaticum* Schau. apud B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 86 in syn. 1936. *Clerodendron myricoides* var. *eumyricoides* Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 86. 1936. *Cyclonema sylvatica* Hochst. apud B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 86 in syn. 1936. *Cyclonema serrata* Hochst. apud B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 86 in syn. 1936. *Clerodendron sylvaticum* Briq. ex Mold., Alph. List Inv. Names 20 in syn. 1942. *Clerodendron myricoides* (Hochst.) Vatke ex Mold., Alph. List Inv. Names 19 in syn. 1942. *Clerodendron myricoides* Vatke ex Mold., Résumé 451 in syn. 1959. *Clerodendron myricoides* var. *glabra* "Schweinf. ex Engl." apud Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 800 in syn. 1962. *Clerodendron myricoides eumyricoides* Thomas apud Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 800 in syn. 1962. *Cyclonema myricoides* var. *sylvaticum* (Hochst.) Schau. apud Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 800 in syn. 1962. *Clerodendron myricoides* "(Hochst.) R. Br. ex Vatke" apud Boaler, Journ. Ecol. Brit. 54: 473. 1966. *Clerodendron myricoides* "(Hochst.) R. Br. ex Vatke" apud Astle, Kirkia 7: 95. 1968. *Clerodendron myricoides* "(Hochst.) sensu lato Vatke R. Br. ex Vatke" apud Richards & Morony, Check List Fl. Mbala 237. 1969.

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Schau. in A. DC., Prodr. 11: 675--676. 1847; A. Rich., Tent. Fl. Abyss. 2 [Voy. Abyss. 3 (5)]: 171. 1851; Buek, Gen. Spec. Syn. Candoll. 3: 108. 1858; Bocq., Adansonia, ser. 1 [Baill., Rec. Observ. Bot.] 3: [Rev. Verberac.] 217, pl. 15. 1863; Aschers. in G. Schweinf. Beitr. Fl. Aethiop. 1: 119 & 278. 1867; Hook. f., Curtis Bot. Mag. 96 [ser. 3, 26]: pl. 5838. 1870; Oliv., Trans. Linn. Soc. Lond. 29: 133. 1875; Edgeworth, Pollen, ed. 1, 26, 76, & 94, pl. 1 (8) & 6, fig. 100 (1877) and ed. 2, 26, 76, & 94, pl. 1 (8) & 6, fig. 100. 1879; Vatke, Linnaea 43: 535. 1882; Balf. f., Trans. Roy. Soc. Edinb. 31 [Bot. Socotra] 235 & 417. 1888; Engl., Hochgebirgsfl. Trop. Afr. 356--357. 1892; Gürke, Engl. Bot. Jahrb. 18: 181 & 182. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561 & 705. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 176. 1895; Gürke in Engl., Pflanzenw. Ost-Afr. C: 341. 1895; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 967. 1895; J. G. Baker in Thiseit.-Dyer, Fl. Trop. Afr. 5: 295, 310, 311, 515, & 519. 1900; Gürke, Engl. Bot. Jahrb. 28: 298--301, 303, & 304. 1900; Hiern, Cat. Afr. Pl. Welw. 4: 844--846. 1900; K. Schum., Justs Bot. Jahresber. 28 (1): 496. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 101. 1901; H. H. W. Pearson in Thiseit.-Dyer, Fl. Cap. 5: 218 & 223. 1901; K. Schum., Justs Bot. Jahresber. 28 (1): 496. 1902; Wood, Natal Pl. 3 (4): pl. 282. 1902; Almagia in Pirotta, Ann. Ist. Bot. Roma 8: [Fl. Col. Erit.] 134. 1903; Gürke in Warb., Kunene-Sambesi Exped. 351. 1903; Hegi in Warb., Kunene-Sambesi Exped. 443. 1903; Thiseit.-Dyer, Ind. Kew. Suppl. 2: 172. 1904; S. Moore in Baker, Moore, & Rendle, Journ. Linn. Soc. Lond. 37: 194 & 198. 1905; Gibbs, Journ. Linn. Soc. Lond. Bot. 37: 464. 1906; DeWild., Ann. Mus. Cong. Belg., ser. 5, 3: 134--135. 1909; Fiori, Boschi Pianta Legn. Eritrea 324. 1909; DeWild., Bull. Jard. Bot. Brux. 3: 267. 1911; Fiori, Agric. Colon. Ital. 5: Suppl. 100--101. 1911; S. Moore in Rendle & al., Journ. Linn. Soc. Lond. Bot. 40: 167. 1911; DeWild., Ann. Mus. Cong. Belg. Bot., ser. 5, 3: 468. 1912; Fiori, Buschi Pianta Legn. Eritrea [Bibl. Agr. Colon. 7:] 323--324. 1912; DeWild., Bull. Roy. Soc. Bot. Belg. 51 (3) [ser. 2, 1]: 47, 91, 188, 280, & 294. 1913; DeWild., Feddes Repert. Spec. Nov. 13: 145. 1914; Holland, Kew Bull. Addit. Ser. 9 [Useful Pl. Nigeria 3]: 523. 1915; R. E. Fries in Von Rosen, Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. Bot. 1: 275 (1916) and 2 (2): 275. 1916; H. Hallier, Meded. Rijks Herb. Leid. 37: 78. 1918; DeWild., Bull. Jard. Bot. Brux. 7: 179. 1920; DeWild., Pl. Bequaert. 2: 265--266 & 269--270. 1922; Good & Exell, Journ. Bot. Brit. 68, Suppl. 2: 141. 1930; Irvine, Fl. Gold Coast 109. 1930; Stapf, Ind. Lond. 2: 239 & 380. 1930; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1072. 1932; Watt & Breyer-Brandwijk, Med. Poison. Pl. S. Afr., ed. 1, 155 & 230. 1932; A. W. Hill, Ind. Kew. Suppl. 8: 54. 1933; Junell, Symb. Bot. Upsal. 1 (4): 101, 106, & 107. 1934; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 10, 14, 16, 17, 47, 48, 86, & 94. 1936; Ball, Kew Bull. Misc. Inf. 1937: 24. 1937; Mold., Annot. List 108, 1939; Mold., Alph. List Comm. Vern. Names 28. 1939; Mold., Geogr. Distrib. Avicenn. 37. 1939; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 101. 1941; Hutchinson & Bruce in Gillett, Kew Bull. Misc. Inf. 1941: 177. 1941; Mold., Alph. List Inv.

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Afr. Nat. Hist. Soc. Nat. Mus. 154: 25. 1975; Moriarty, Wild Fls. Malawi 139 & 140, pl. 70. 1975; L. H. & E. Z. Bailey, Hortus Third 286. 1976; Isaacson, Flow. Pl. Ind. 1: 336. 1979; Mold., Phytologia 46: 183. 1980; Mold., Phytol. Mem. 2: 201--204, 210, 219, 222, 223, 225, 226, 229, 230, 232, 235, 237, 240, 245, 249, 350, 387, 392, 396, 437, & 540. 1980; Blundell, Wild Fls. Kenya 108 & 155, pl. 44, fig. 285. 1982; P. Holmgren & al., Ind. Vasc. Pl. Type Microf. 442. 1985; Mold., Phytologia 57: 37, 339, 471, 472, & 476 (1985), 58: 185, 332, 357, 358, & 442 (1985), 59: 110, 248, 249, 255, 258--264, 266, 350, 410, & 480 (1986), and 62: 128 & 200. 1987; Gillett, Tweedie, & Fulton, Guide Some E. Afr. Upland Fls. 6. n.d.

Illustrations: Bocq., Adansonia, ser. 1 [Baill, Rec. Observ. Bot.], 3: [Rev. Verbenac.] pl. 15. 1863; Hook. f., Curtis Bot. Mag. 96 [ser. 3, 26]: pl. 5838 (in color). 1870; Edgeworth, Pollen, ed. 1, pl. 1, fig. 8, & pl. 6, fig. 100 [cytol.]. 1877; Wood, Natal Pl. 3 (4): pl. 282. 1902; Fiori, Boschi Piante Legn. Eritrea 324. 1909; Fiori, Agric. Colon. Ital. 5: Suppl. 101. 1911; Fiori, Bibl. Agr. Colon. 7: 324. 1912; Mold. in Humbert, Fl. Madag. 174: 159, fig. 24 (4). 1956; Lind & Tallantire, Some Comm. Flow. Pl. Uganda, ed. 1, fig. 90. 1962; W. C. Burger, Fam. Flow. Pl. 198, fig. 60. 1967; Uganda postage stamp Minkus no. 122 (in color). 1969; Lind & Tallantire, Some Comm. Flow. Pl. Uganda, ed. 2, [151], fig. 90. 1971; J. F. Morton, Exot. Pl. 120 (in color). 1971; Palmer & Pitman, Trees South. Afr., ed. 2, 1966 & 1967. 1972; Moriarty, Wild Fls. Malawi 139, pl. 70. 1975; Blundell, Wild Fls. Kenya pl. 44, fig. 285 (in color). 1982.

A scrambling bush or scandent to erect shrub, or even a small tree, 1--4.5 m. tall, branched and spreading, rarely herbaceous, very polymorphic and variable, fetid; stems basally gray to light-brown, to 1.25 cm. thick, the younger ones green with red on the angles; branches terete or angled, few, striate, prominently lenticellate, with yellowish-brown or light-brown bark, the younger parts pubescent with short multicellular hairs or glabrescent; branchlets medium, gray, obtusely tetragonal, glabrous or glabrescent; leaf-scars prominent; floriferous twigs very slender, green or brownish, glabrous, bearing a few groups of leaves at the base and then numerous groups of cymes in the axils of leaf-like bracts; nodes not annulate; principal internodes 2--6 cm. long; leaves mostly ternate, small, petiolate or subsessile, with a disagreeable odor, the younger ones pinkish-brown; petioles very slender, 0.2--2 cm. long, often winged, or obsolete, glabrate or minutely and obscurely pulverulent or puberulent, sometimes pubescent on immature leaves; leafblades membranous, uniformly green on both surfaces or lighter beneath, broadly elliptic or elliptic to oblong, 4--17 cm. long, 1.5--7.5 cm. wide, mostly $1\frac{1}{2}$ -- $2\frac{1}{2}$ times as long as wide, apically acute to rather long-acuminate, rarely rounded, marginally irregularly and acutely or obtusely serrate or incised-serrate toward the apex or subentire (the teeth sometimes apiculate), sometimes reddish-brown, basally long-acuminate or cuneate and prolonged into the more or less alate petiole, glabrous or practically so on both surfaces or very minutely and obscurely scattered-strigillose above and pulverulent or

finely pubescent beneath, more densely pubescent with short multicellular hairs when immature but usually soon glabrescent; midrib very slender, mostly flat above and prominulous beneath; secondaries very slender, 4--7 per side, arcuate-ascending, flat above, conspicuous and slightly subprominulous beneath, only the uppermost ones plainly joined in broad loops near the margins; tertiaries few and irregular; veinlet reticulation fine, mostly obscure; inflorescence terminating short and leafy axillary branchlets or twigs; cymes borne axillary to the foliaceous bracts in rather elongated terminal panicles, each cyme rather few- (mostly 1--4-) flowered, long-pedunculate, lax, widely divergent or reflexed, bracteate; panicles often elongate, to 25 cm. long and 12 cm. wide, the sympodia elongate, very slender, finely puberulent or glabrate; peduncles to 5 cm. long, red above, green beneath; bracts large and foliaceous, similar to the leaves in all respects but smaller, elliptic to lanceolate, caducous; bractlets and prophylla linear or linear-lanceolate to filiform, 1--7 mm. long, glabrate or ciliate; pedicels 2--5 mm. long; flowers fetid or "sweet-scented" [*fide* Maas-Geesteranus]; buds black; calyx broadly campanulate, 4--7 mm. long, green, flushed with purple, or reddish-green, externally glabrous or with a few, short, scattered hairs, the tube campanulate, its rim 5-lobed, ciliate, the lobes foliaceous, short, ovate or broadly ovate, spreading, 4--5 mm. long, slightly longer than the tube, apically obtuse or rounded, profusely glandular, with the intervening sinuses sharply acute; corolla zygomorphic, blue or violet, occasionally white, to 1.8 cm. long, the tube short, curvate, to about 8 mm. long, villous in the throat, otherwise glabrous, the limb about 1.5 cm. wide, the 4 upper lobes obovate or oblong, often white or greenish-white to pale-blue, subequal, 8--13 mm. long, apically obtuse or rounded, the lower lobe obovate-cuneate or spatulate, about twice as long as the upper ones, concave, usually pale- or deep-blue, about 2 cm. long; stamens long-exserted, 2--2.5 cm. long, arcuate; filaments incrassate, pale purplish-violet to gray-blue or white, densely villous with shaggy hairs on the lower half; anthers short, brown, 1--2 mm. long; receptacle purple-blue; style long-exserted, white to gray-blue; stigma shortly bifid; ovary globose, black, externally glabrous, glandular, 2-celled, with 2 ovules in each cell; fruiting-calyx accrescent, 9--12 mm. wide; fruit drupaceous, apically 10--12 mm. wide, deeply lobed, at first blue, black when ripe, composed of 4 nutlets, 2--4 seeded.

This very variable species is found from the Sudan, Ethiopia, Eritrea, and Somalia, through Zaire, Tanzania, and Kenya, to Zimbabwe, Angola, the Transvaal, and Madagascar, in occurs in cultivation in the United States and Europe. Eight rather poorly defined varieties occur in parts of central Africa.

The so-called *Clerodendron myricoides* var. *attenuatum* DeWild. is what we now call *C. quadrangulatum* Thomas, var. *cuneatum* (Gürke) H. H. W. Pearson is now known as *C. cuneiforme* Mold., which see, while var. *laxum* Gürke appears to be a synonym of var. *camporum* Gürke and *Siphonanthus myricoides* var. *herbacea* Hiern seems to be a herbaceous Angolan form based on *Welwitsch* 5768.

Schauer (1847) describes his var. *sylvaticum* as "foliis obovatis hirtis praesertim ad venas, calycibus hirtis-pubescentibus, floribus minoribus", based on Krauss 333 from South Africa, and notes that it is a "Forma magis pubescentes, in hac familia vix tanquam verae varietates notandae". From the description it would seem that this so-called variety may well be a form of *C. discolor* (Klotzsch) Vatke, but Thomas (1936) maintains it as a synonym of typical *C. myricoides*. An unnumbered Krauss specimen, collected in October of 1839, examined by me, is plainly *C. discolor* var. *oppositifolium* Thomas, which see. Almagia (1903) mis-cites the Schauer (1947) reference to page "670" instead of page 676.

Collectors have encountered what appears to be typical *C. myricoides* on moist brushy slopes by streams, in loam, in sandy soil at the edges of swamps, in thick undergrowth, in littoral woods and in woods near streams, on grasslands, in clearings, along streamsides, along roadsides, in savannas and scrubland, in secondary forests and at forest margins, in old streambeds, in secondary *Brachystegia* woods, and in damp places in general, at altitudes of 125--2800 m., in flower from March to January, and in fruit in April, May, and October. Burger calls it a "common shrub" in Ethiopia, where, he avers, it grows on rolling hills with extensive cultivation of sorghum and maize in dark-brown soil with an Hp of 6.5--7.8. Jacobsen (1973) describes it as occasional in riparian thickets. Lucas, in Kenya, refers to it as scattered around the edges of forests, usually in the more open situations. In Uganda Langsdale-Brown and his associates (1964) found it to be sparse in areas regularly burned with intermittent grazing and in cultivation for at least 20 years. Compton (1966) reports it "scarce by water" in Swaziland; in the Transvaal Smuts & Gillett describe it as "scrambly bushes under big trees"; in the Kruger National Park it is said by Van der Schijff (1969) to grow "in bushgroups and rocky koppies". Venter (1972) found it in Zululand.

Maas-Geesteranus, in Kenya, encountered *C. myricoides* "in open savanna-woodland along the south edge of a forest with scattered *Acacia lahel*, *Erythrina* sp. cfr. *tomentosa*, *Syzygium cordatum* and clumps of shrubs in boulder-strewn country sloping southward".

Linsen & Giesem describe *Clerodendrum myricoides* in Kenya as a "small erect shrub, 1--2 m. tall, at base stem is less than 1 cm. thick and gray to light-brown, younger stem is green with red especially along corners, sometimes leaf-margin is reddish-brown, peduncles red on top, green beneath, calyx green to reddish-green and with a purple margin, corolla has biggest petal dark-blue to purple, other petals pale-blue to purple in front and creamy-gray at back, stamens and gynoecium white to gray-blue, anthers brown, receptacle purple-blue -- on volcanic slopes with rocky scrubland, often as solitary shrubs."

Palmer & Pitman (1972) tell us that "*Clerodendrum myricoides* [in southern Africa] appears to be principally a Transvaal species, growing from Pretoria through the central districts to the north, and is also reported from Natal, Swaziland and Botswana. It grows in bush-veld, scrub, grassveld, in dune and river forest, and on

rocky koppies and hillsides.....It is usually a shrub but occasionally grows into a tree up to 4.5 m. high, with a slender greyish-white or brown flaky bark and smooth rather angled branches marked with many leaf scars.....This neat, pretty little tree has been cultivated at the Botanic Gardens at Brummeria on the outskirts of Pretoria, but it is doubtful if it has found its way into private gardens." Dale & Greenway (1961) assert that in Kenya it is "Not uncommon in wetter scrub and savanna bush" from 3000 to 8000 feet altitude.

Moriarty (1975) avers that in Malawi this plant "is found in wooded grassland from Mulanje, Blantyre, Dedza, Mzinba to Karonga", flowering there from October to January. Blundell (1982) reports that in Kenya it is found "in bushland and forest margins at 1,500--2,400 m (5,000--8,000 ft.) in all except the driest areas".

Hooker (1870) describes the species as "A small stove shrub, which has long been in cultivation in the Palm-house at Kew, flowering annually in spring; but how and from whom procured is not known. The genus to which it belongs [*Cyclonema*], a very near ally, if not indeed identical with *Clerodendron*, is a native of tropical and subtropical Africa; where *C. myricoides* extends from Abyssinia to Natal; in the former country ascending to 7000 feet elevation. A very similar, or probably identical species, has been collected by Consul Petherick on the banks of the White Nile in lat. 7° to 8° N., and the *C. serratum*, Hochst. of Abyssinia, is probably another variety of it." Rose (1968) reports the species cultivated in France.

The corollas are described as having been "blue" on Bequwert 6851, Lucas 103, Peter 31361, and Strid 2509 and by Irvine (1930), as "light-blue" on Strid 2131 and by Schweinfurth (1867), "purple" by Venter (1972), "violet" on Ghiesquiere 3614 and by Cufodontis (1962), Drar (1970), and Gürke (1895), as "sky-blue" on Bogden B.48, "blue, lilac, & white" on Burger 1884, as "red & white" on Allen 368, as "white or pale-blue, the lower lobes dark-blue" by Blundell (1982), "lower lip dark-blue, the other lobes light-blue" on Fries 457, "lower lip dark-blue, lateral lobes pale-blue" on Feucht 82, "upper lobes white, lower usually pale-blue" by Baker (1900), "upper lobes white or pale-blue, lower lobes blue-violet" by the Baileys (1976). "bicolored, upper petal bluish, lower ones pinkish" on Meyer 7613, "4 pale-blue lobes, the fifth much darker blue" by Moriarty (1975), and "purplish-violet, the lower lip with a pale midpetaline band, on either side bounded by a zone of rich purple" on Maas Geesteranus 5203.

Edgeworth (1877) describes the pollen of this species as spherical, echinulate, unaltered in water. A wood section accompanies Meyer 7613 from Ethiopia.

The leafblades on Burger 1884 & 2066a are small, firmly chartaceous as in var. *chartaceum* Mold. but perfectly glabrous beneath!

Gürke (1895) comments about this species: "Ein kleiner Halbs-trauch mit lanzettlichen Bl[ättern], deren Form ausserordentlich variabel ist und mit violetten Bl[umen]. -- Meist im Schatten und an feuchten Orten, in Strandwäldern und auf feuchten beschatteten Termitenhügeln."

DeWildeman (1922) describes this plant in detail under the designation of "*Clerodendron myricoides* R. Br. sec. Wernham in Herb. Brux. non Hook. in Bot. Mag. tab. 5838" and comments that "Une étude approfondie des plantes rentrant dans la série des formes réunies ci-dessus, amènerait peut être une subdivision plus considérable encore, mais nous n'oserions le faire sur le vu de matériaux par trop incomplets. On aura remarqué, en effet, que plusieurs plantes sont signalées comme arbustes, d'autres comme lianes; il y a là, peut-être, une indication."

Gürke (1900) discusses his concept of *C. myricoides* as follows: "Diese Art, welche im ganzen tropischen Afrika verbreitet zu sein scheint, ist sehr variabel und formenreich. Die Abänderungen erstrecken sich hauptsächlich auf die Grösse, Consistenz und Behaarung der Blätter, und in dieser Beziehung sind alle nur möglichen Übergänge vorhanden, die eine Abgrenzung in bestimmte Varietäten sehr erschweren. Wenn ich nach dem mir vorliegenden Material eine solche Gruppierung versuche, muss dieselbe als eine nur vorläufige betrachtet werden, da vorauszusehen ist, dass nach dem Eintreffen von besserem Material noch mehr Formen herausgegriffen werden können..

"Die in den bergigen Gegenden von Abyssinien, meist in Höhen von 1700--2300 m am häufigsten vorkommende Form besitzt kleine Blätter, welche eine Länge von 5 cm nicht überschreiten, aber zuweilen bis auf 1 cm Länge herabgehen; sie sind gewöhnlich fein flaumig behaart, auf der Unterseite dichter; bei einigen Exemplaren fehlt die Behaarung fast ganz, bei anderen wird sie stärker und es sind dabei alle Übergänge zu beobachten; auch zwei Welwitschische Pflanzen aus West-Afrika würden hierher zu zählen sein. Diese Form bezeichne ich als var. *microphyllum*. Die übrigen Formen haben grössere Blätter, welche etwa zwischen 6--12 cm Länge variieren. Darunter fallen zunächst Exemplare auf mit lederartigen, derben Blättern, welche ganz schwach behaart oder beinahe kahl sind und einen sehr grob gesägten Rand besitzen; diese möchte ich als var. *grosseserratum* bezeichnen. Den Gegensatz dazu bilden westafrikanische Exemplare mit meist grossen, dünnhäutigen, ganz kahlen Blättern, die alle offenbar feuchteren Standorten und wahrscheinlich meist dem Walde oder dichtem Busch entstammen; der Rand der Blätter ist meist mit wenigen unregelmässigen Sägezähnen versehen; diese fasse ich als var. *laxum* zusammen. Schliesslich heben sich noch als deutliche Varietät Exemplare von Angola und dem Kongogebiet heraus; diese haben Blätter von mittlerer Grösse, meist von 6--8 cm Länge wechselnd, dabei auch von mittelstarker Consistenz, nicht lederartig, wie bei var. *grosseserratum*, und nicht so dünnhäutig, wie bei var. *laxum*; die Behaarung ist stets eine schwache und auffallend ist mehr oder weniger stark ausgeprägte grauweisse Färbung der Blattunterseite; der Rand ist meist schwach gesägt; ihrem ganzen Habitus nach scheinen die Exemplare trockenen Steppengegenden zu entstammen; ich bezeichne sie als var. *camporum*."

Thomas (1936) comments that "Nach Fries (1924)....ist *C. myricoides* im ganzen tropischen Afrika weit verbreitet, auch in Natal. Die Abbildung im Bot. Mag. 5838 entspricht in bezug auf die Kelchspaltigkeit nicht dem Typus *Schimper* 330. Der von de Wildemann...

aufgestellte neue Typus leg. Vanderyst det. Wernham entspricht gleichfalls keineswegs dem Schimperschen Urtypus, sondern steht Arten nahe, die schon vor de Wildemann aufgestellt, von diesen aber gänzlich unberücksichtigt gelassen wurden; die von ihm in dieser Untergattung neu beschriebenen Arten sind daher alle schon bekannt."

Dale & Greenway (1961) state that "Greenway considers *C. discolor* (Klotzsch) Vatke to be "unworthy of specific rank and should revert to a variety of *C. myricoides*." The two species are, indeed, very closely related. Morton (1971) is of the opinion that *C. ugandense* Prain is also "probably" only another variety of *C. myricoides*; on Ash 2947 it is actually given as a synonym on the collector's label.

It may be worth mentioning that the *Herb. Hort. Kew s.n.* in the Kew herbarium, cited below, is the actual original from which plate 5838 in the Botanical Magazine of Curtis (1870) was drawn and painted.

Common and vernacular names reported for *Clerodendrum myricoides* include the following: "aseme", "asème", "assem", "blue glorybower", "butterfly bush", "chemogong", "chemogong'isyek", "chesagan", "chesamisyet-ab-soin" [samis = bad odor, ab soin = of the grass-lands], "eishrango", "ekweru", "ghria-nash", "kikonge", "magari", "marari", "mara-sisa", "mnindi", "mnindí", "mnindíndí", "muguya", "mujugaidia", "mukuzanya", "munjugu", "mun-tuga", "muserich", "muweya", "muzainanya", "mzuma", "obetyot", "ol mokodat", "omukuza-nyana", "soulthe", "soulthé", "sulthé", "surbaterie", "surba-terie", "surbatri", "sur-batteri", "surbattri", "surbetri", "surubatri", "um bozwa", and "umbozwa tree".

Watt & Breyer-Brandwijk (1962) and Bally (1937) tell us that the Masai tribesmen use the root bark of this plant as a remedy for East Coast fever in cattle and for diarrhea in calves. The plant is also used in treating dysmenorrhea and sterility in women, for impotency in men, and as a remedy for coughs, furunculosis, and "swellings of the body associated with debility". The roots are also employed in East Africa to treat enlargement of the spleen. Extracts of the plant have given negative antibiotic tests. The plant is regarded as medicinal in the Transvaal.

Glover (1967) states that in Kenya a broth made from the roots of *C. myricoides* is used as a remedy for rheumatism and other ailments -- it contains a pungent-smelling volatile oil. Palmer & Pitman (1972) assert that "The plant is a snake-bite remedy and has been used -- and possibly still is -- by both Europeans and Africans. It was brought to the notice of the botanist, Rudolf Marloth, as having been used by one Natal enthusiast -- and successfully -- for over 30 years to treat puffadder bites. No details were furnished."

Innamorati (1973) says that in Kenya the medicinal uses are: "le radici di queta pianta sono adoperate quale contravveleno nelle morsicature delle vipere. Il paziente rosicchia e mangia la radice come viene raccolta. Non so se riesca, non avendo mai assistito a cure del genere; ma i neri ne dicono mirabilia."

Junell (1934) states that, unlike the condition in *Kalaharia*, in *C. myricoides* "reicht der Fruchtblattrand nicht unter die Mikropyle hinab."

[to be continued]

NOTES ON MABEA (EUPHORBIACEAE) IN CENTRAL AMERICA,
TOGETHER WITH COMMENTS ON SECT. APODAE IN BRAZIL

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MABEA EXCELSA Standley & Steyerl., Publ. Field Mus.
Nat. Hist., Bot. Ser. 23: 123. 1944. TYPE:
Guatemala. Quezaltenango: Colomba, 2800 ft, 27
Dec. 1934 (fr), Alexander F. Skutch 2008
(holotype, F), distributed as "Gymnanthes?"

Tree 5-10(-30) m high, the twigs and herbage
glabrous. Leaves alternate; stipules deltate, 0.5-1 mm
long, caducous; petioles 4-13 mm long; blades
membranous to chartaceous, 5-11 cm long, 1.5-4.5 cm
wide, 1.8-4 times as long as wide, oblong to oblong-
lanceolate, shiny above, glaucous below, the base
rounded to obtuse, the margins short-serrate, the apex
strongly cuspidate-acuminate; lateral nerves 10-18 per
side, prominulous below, the tertiary veins reticulate,
conspicuous. Thyrses arranged in panicles at ends of
branches, short-pedunculate, 3-8 cm long, 4-12 mm wide,
densely puberulent, wholly staminate or with a single
pistillate flower at the base. Staminate flowers in
small sessile 3-flowered umbels, these subtended by
biglandular bracts, the glands oblong, 0.7-1 mm long,
not raised above the axis of the thyrses; calyx 5-lobed,
the lobes unequal, to 0.8 mm long; stamens 3-6.
Pistillate flowers subtended by paired oblong eglan-
dular bracts ca. 0.8 mm long; peduncles ca. 5 mm long;
calyx 6-lobed, 1.5-2.3 mm long, the lobes acuminate;
styles 6-8 mm long, connate ca. half their length.
Capsules ovoid to subglobose, very shallowly 3-lobed,
12-14 mm long, 12-15 mm in diameter, minutely and
densely brown-puberulent; seeds 7-10 mm long, 6-7 mm
wide.

ADDITIONAL SPECIMENS. COSTA RICA. PUNTARENAS: a la
par del Rio General, 19 May 1967 (fl), Sáenz & Nassar
129 (USJ-4444).

NICARAGUA. GRANADA: Volcán Mombacho, road to
Hacienda Cutirre, ca. 11°50'05"N, 85°56'W, ca. 480 m, 7
May 1983 (fl), Grijalva 2522 (F); Volcán Mombacho.
Finca "Las Delicias," 10 km S of Granada, 11°51'N,

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85°57'W, ca. 340-360 m, 11 May 1981 (fl), Moreno & Henrich 8444 (F). MATAGALPA: along road from Muy Muy to Equipulas, ca. 19 km W of Muy Muy, ca. 12°42'N, 85°45'W, ca. 400 m, 30 July 1978 (fl), Stevens 9561 (MO).

MEXICO. CHIAPAS: Husicil, Escuintla, 18 July 1947 (fl, fr), Matuda 16728 (F).

Because it has long been known only from fruiting material, the systematic position of Mabea excelsa has been uncertain, and identifying characteristics have been hard to come by. In the protologue, it was distinguished from M. occidentalis Benth., the only other Guatemalan species, by the absence of a collecting nerve along the margins of the leaves of the former and by the smaller seeds of the latter. Comparison of the type specimen of M. excelsa with abundant collections of M. occidentalis from Central America, however, fails to reveal any convincing differences in either seed size or venation of the leaves.

The capsules of the type specimen of M. excelsa are arranged separately on short branchlets loosely clustered at the ends of leafy shoots. This indicates a paniculate arrangement of the thyrses, a relatively uncommon state in Mabea that is best known in the widespread South American species M. nitida Benth. By contrast, M. occidentalis has solitary terminal thyrses, the more usual condition.

In recent years several flowering collections of M. excelsa from Central America have become available, making possible for the first time a description of the inflorescences and flowers, as well as an assessment its relationships within Mabea. These additional collections also constitute a considerable range extension for the species, which had previously been known only from Guatemala and the state of Chiapas, Mexico.

In the system of Pax & Hoffmann (1912: 26-42), Mabea excelsa would be assigned to section Apodae Pax & K. Hoffm. by virtue of the disposition of the staminate flowers in sessile 3-flowered umbels, in contrast to the pedunculate cymules of sections Intermediae Pax & K. Hoffm. and Umbelluliferae Pax & K. Hoffm., or the spiciform racemes of section Spiculigerae Pax & K. Hoffm. The species of section Apodae, other than M. excelsa, are known only from Brazil, where there are at least three, and perhaps as many as five, species. All have the delicate thyrses arranged in panicles that are characteristic of M. excelsa. The only species that has been collected with any degree of frequency is M. paniculata Spruce ex Benth. from the rainforests of Pará. Mabea pohliana (Benth.) Muell. Arg. is a distinc-

tive species from Bahia and Goiás. An obscure pair of species from Mato Grosso, *M. crenulata* S. Moore and *M. indorum* S. Moore, have heretofore been known only from their types. According to Pax (1912) these two species differ only in the lengths of the staminate pedicels (ca. 1 mm in *M. crenulata*, to 4 mm in *M. indorum*), and further collections may well show that only a single species is involved. Two modern collections matching the description in *M. indorum* are now available and are cited below. The only other species assigned to sect. *Apodae* by Pax, *M. anomala* Muell. Arg., is apparently still known only from the type collected by Riedel near Manaus, and is unknown to me except from the description.

Within sect. *Apodae*, *M. excelsa* is most easily distinguished by the number of stamens per flower, which is 2 or 3 in *M. pohliana*, 3-6 in *M. excelsa*, and 10-12 in the remainder of the section. It further differs from *M. pohliana*, the only species in which the stamen number approaches that of *M. excelsa*, by its glabrous leaves in contrast to the ferruginous-tomentose leaves of *M. pohliana*.

ADDITIONAL SPECIMENS OF *Mabea indorum*. BRAZIL. MATO GROSSO: on the banks of Rio dos Bugres, Oct. 1891 (fl), Spencer Moore 436 (holotype presumably at BM, not seen; photo of isotype, F! ex B, F neg. 5423); Mun. Nobres, along Rio Celeste at BR 163, 52 km S of Sinop (km 775), 12°18'S, 55°37'W, 16 Sept. 1985 (fl), Thomas et al. 3806 (MO, NY); Mun. São Felix do Araguaia, W bank of Rio Araguaia on islet called Lago Inglês, 11°34'S, 50°43'W, 7 Oct. 1985, Thomas et al. 4263 (MO, NY).

MABEA JEFENSIS Huft, sp. nov. TYPE: Panama. Panamá: newly bulldozed trail off Cerro Jefe road, 0.4 km beyond turnoff to Alto de Pacora, 29 Sept. 1975 (fl, fr), J. T. & F. Witherspoon 8570 (holotype, MO).

Arbor parva, ramunculi foliaque glabra. Folia oblonga, oblonga-elliptica vel late lanceolata, supra nitida, infra glauca, basi obtusa vel rotundata, margine integra vel remote serrulata, apice brevius-acuminata vel cuspidata. Inflorescentia terminalis puberula, pilis minutis brunneis stellatis; cymulae masculae glandulae elevatis; stamina 10-15 in quoque flore. Capsula ovoidea dense puberula, pilis minutis stellatis brunneis vel rubris; styli ad fructus maturitatem 4-9 mm longi; semina ovoidea lateraliter

compressa atrobrunnea.

Shrub or small tree, 2-10 m high, the twigs and herbage glabrous. Leaves alternate; stipules narrowly lanceolate, 5-10 mm long, caducous; petioles 5-12 mm long; blades membranous to chartaceous, 6-14 cm long, 2.5-6.5 cm wide, 1.8-3 times as long as wide, oblong, oblong-elliptic, or broadly lanceolate, the upper surface usually shiny, the lower usually glaucous, the base obtuse to rounded, the margin entire to remotely serrulate, the apex short-acuminate or cuspidate; lateral nerves 10-14 per side, prominulous below, the tertiary veins reticulate, conspicuous. Thyrses terminal, solitary, puberulent with minute brown stellate hairs, bearing solitary pistillate flowers toward the base and numerous 3-flowered staminate cymules distally, these subtended by biglandular bracts, the glands oblong, elevated above the rachis; peduncle 3-4 mm long; calyx 5-lobed, the lobes connate for 1/4 to 1/2 their length, broadly ovate or deltate, 0.8-1.2 mm long; stamens 10-15. Pistillate flowers 2 or 3, solitary at basal nodes; bracts deltate, eglandular, ca. 3 mm long, ca. 2 mm wide; pedicel 2-8 mm long, calyx lobes separate, subequal, ovate, ca. 2 mm long, ca. 1.5 mm wide; undivided portion of the styles at maturity 4-9 mm long. Capsules ovoid, 10-12 mm long, minutely and densely puberulent with reddish or brownish stellate hairs; seeds ca. 1 cm long, ovoid, laterally compressed, dark brown, smooth, with a yellow caruncle ca. 1.5 mm in diameter.

Mabea jefensis is endemic to Panama and differs from the other two species of Mabea there (M. montana Muell. Arg. and M. occidentalis Benth.) by the elevated glands of the staminate cymules, the smaller number of stamens (10-15 vs. more than 30), and the shorter undivided portion of the styles at maturity (4-9 mm vs. 12-20 mm). It seems to be most closely related to M. piriri Aublet of the lowland rainforests of Venezuela, Guayana, and Suriname. Both species are small trees with similar habits, leaves, and inflorescences. The inflorescence of M. piriri, however, is larger and is densely white-puberulent. The peduncles and pedicels of flowers of both sexes are longer and more flexuous in M. piriri, and the capsules are larger. Furthermore, the staminate cymules of M. jefensis are more or less recurved at the tip of the peduncles, whereas those of M. piriri are not.

Mabea jefensis is known from abundant collections in montane and premontane rainforests between 350 and 1000 m both from the Cerro Jefe area and from the

Continental divide north of El Llano in eastern Panama province, as well as from a single collection from the Cañazas mountain range in the western part of the province. The species is illustrated in Webster & Huft (1987), where numerous additional collections are also cited.

I am grateful to Dr. Timothy Plowman and Dr. Charlotte Gyllenhaal for reading the manuscript and providing helpful suggestions.

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- Webster, G. L. & M. J. Huft. 1987. Revised synopsis of
Panamanian Euphorbiaceae. Ann. Missouri Bot. Gard.
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BOOK REVIEWS

Alma L. Moldenke

"GENES" by Benjamin Lewin, xiii & 715 pp., 476 multi-col. fig. incl. 89 photo. & 29 tab. John Wiley & Sons, New York, N. Y. 10158. 1985. \$40.95.

This is an excellent source book and thorough text on all known phases of gene nature, activity and consequences. The famous author considers this work "a comprehensive introduction to the molecular biology of the gene,.....assumes no prior knowledge and is up to date with current research." The very first chapter - as all the others - ends with "Further reading" which in this case selects Benzer's paper "on the modern view of the gene cistron". The explanations are clearcut; all important points are illustrated diagrammatically and effectively with the use of additional gray and rust colored ink; the electron microscope photographs substantiate several of the elaborate illustrations. All biology teachers and all advancing biology students should surely be or become familiar with the contents so clearly presented in this book.

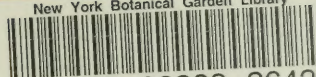
"TAYLOR'S GUIDE TO ROSES" by Norman Taylor, 495 pp., 450+ color photo., 40 b/b fig. & 1 weather zonal map. Houghton-Mifflin Co., Boston, Massachusetts 02108. 1986. \$14.95 paperbound.

This beautifully illustrated, usefully informative and excellently organized book is based on "Taylor's Encyclopedia of Gardening", 4th edition, revised by Gordon P. DeWolf. It is prepared and produced very skillfully and effectively by the Chanticleer Press of New York City which is renowned for the high quality of its work, especially its color photography. The introduction gives the history of modern roses, classification, anatomy, new cultivars and garden designs. Then follow the excellent color plates of climbers, shrubs, floribundas, grandifloras, hybrid teas, etc.. The encyclopedia part gives for each the basic characteristics of the plant, the flowers and the foliage. The appendices describe arrangements, pests and diseases, and list a glossary and names of nurseries.

"THE NATURAL HISTORY OF BUTTERFLIES" by John Feltwell, xviii & 133 pp., 20 color pl., 28 b/w fig., & 8 tab. Facts on File Publications, New York, N. Y. 10016. 1986.

This delightful account by a highly qualified entomologist of butterfly (threatened) life in the English countryside is directed to the lepidophile and naturalist. Biology teachers should find the reading enriching. Entomologists should appreciate sharing the book with their young family members and friends. There are chapters on such topics as: life cycles, coloration, habitats, migration and conservation.

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